RAILWAY Mechanical and Electrical Engineer

APRIL, 1950

PRESENTING—

THE NEW CERTIFIED - - - -

"BUFFALO"

#18

UNIT BRAKE BEAM

(A. A. R. CERTIFICATE No. 51)

The brake heads and wear plates for the #18 brake beam are interchangeable with "Buffalo" Unit Brake Beam #BB-126 now in service

BUFFALO BRAKE BEAM CO.

APRIL, 1950

RAILWAY Mechanical and Electrical Engineer

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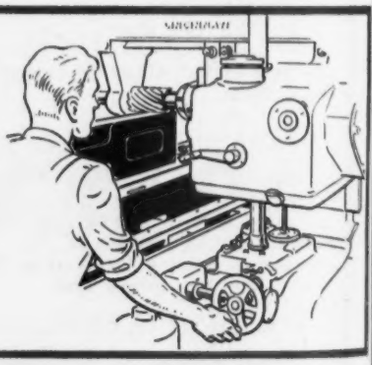
Profile milling a combination locomotive lever, using the front manual servo control on a CINCINNATI No. 56-90 Plain Hydromatic equipped for railroad shops.

Using the rear control for the same hand guided profile milling operation as illustrated at the left.

Hand Guided Profile Milling

... SHORT CUT TO LOW COST OF LOW PRODUCTION

CINCINNATI No. 56-90 Hydromatic Milling Machine with extra features of versatility—including front and rear controls—for milling miscellaneous railroad parts.



This drawing of the rear working station shows how the operator adjusts the vertical position of the spindle carrier, while the table is feeding, to profile mill the work to the lines drawn on it.

Manual control has its advantages for small lot production. It's especially cost-worthy for profile milling, where the outline of the part does not require precise template tracing. The quick, low cost way to handle operations of this type is on CINCINNATI Hydromatic Milling Machines, equipped with servo manual control of the spindle carrier vertical traverse. Just draw the outline of the part on metal, then clamp it by any convenient* means, as the operator has done in the two illustrations. While the table is feeding, mill to shape, following the curvature of the lines by means of the manual vertical control. ¶ Hydromatics equipped with this feature lose none of their usefulness in performing automatic milling operations on a variety of work . . . taking straight milling cuts with plain helical cutters or face mills . . . removing metal in big bites. ¶ There are many styles and varieties of CINCINNATI Hydromatics, all of them having advantages which far outweigh equipment of this type 15 or 20 years old. Want to know more about these machines? Catalog M-1631 for Plain and Duplex Hydromatics; catalog M-1602 for Tracer Controlled Hydromatics.

REPLACE WITH A NEW CINCINNATI

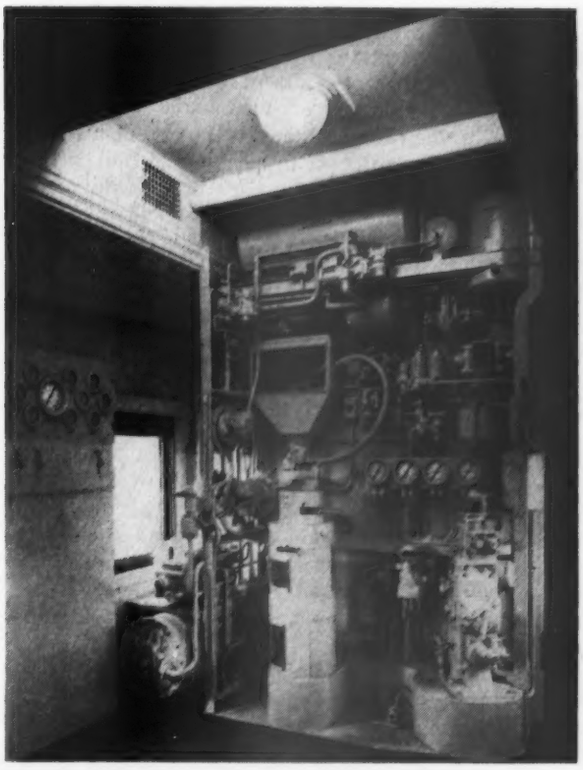
The work is held in two CINCINNATI All-Steel Vises.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI **Cincinnati**

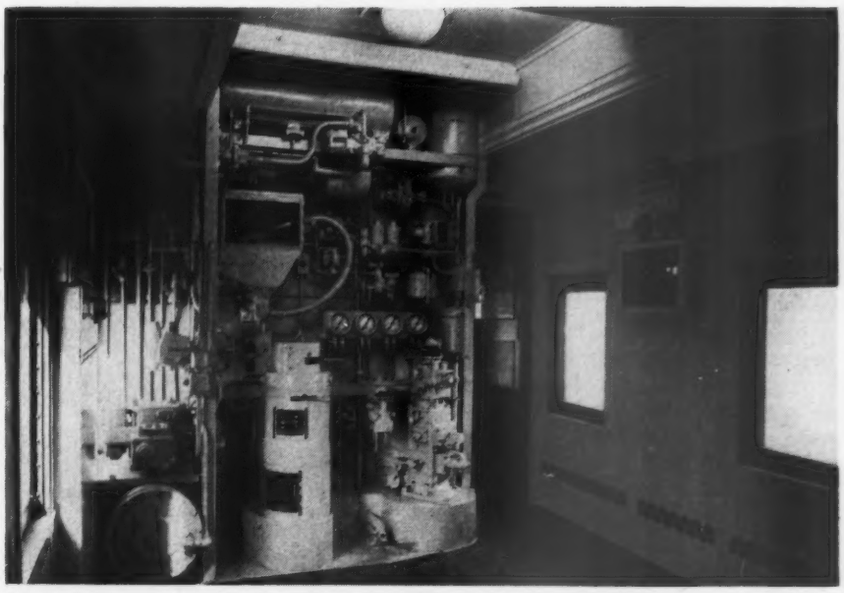
MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUI

Frisco Instruction Car



ST. LOUIS-SAN FRANCISCO Car No. 50 is a combination mobile unit for instructing enginemen, trainmen, shopmen, carmen, electricians and others in the operation and maintenance of Diesel locomotive, electropneumatic and conventional air brakes and other locomotive and car appliances.

The car was originally an all-steel full postal car, and was rebuilt and converted into the instruction car at the Frisco West Coach shop at Springfield, Mo. It is reinforced throughout so that it can be handled in any location in passenger and freight trains.



Instruction equipment and indicating instruments are shown (above) on the left side of car—The control instrument panel (right)

The interior of the car is divided into three sections, i.e., the observation and test room, the sleeping section and the instruction or class room.

The observation and test room contains the test rack or pedestal on which the test instruments are mounted. Information gathered from the use of the instruments is passed to enginemen, trainmen and others interested, to show them where and how the handling of the train could have been improved if any rough handling occurred.

The sleeping section consists of two staterooms with connecting bathroom.

The instruction or class room which is used for lectures and examinations has space for 36 folding chairs which are stored in a locker when not in use. Six dining car-type side tables are used by students when taking examinations. A blackboard is available for chalk talks.

A beaded motion picture screen is used with a projector to show slides, motion pictures and diagram

prints in colors. Lectures with the use of the projector are limited only by the size of the library on hand and can be extended to cover any subject desired.

Located on the wall and floor at the end of instruction or classroom adjacent to sleeping section is the 24 RL passenger Diesel locomotive brake equipment and the HSC car equipment as outlined in the New York Air Brake Company's pamphlets No. 59 and No. 60.

Near the end of the car is a hot water boiler for heating the car when in freight train operation, as well as a kitchenette with propane gas stove, electric coffee maker, refrigerator, sink, water cooler and kitchen cabinet complete with utensils and dishes.

A crew of eight, working in shifts can be comfortably cared for when making long test trips.

The test recording equipment consists of three Esterline-Angus recording instruments. One of these records brake pipe pressure, another brake cylinder pressure and the third, miles per hour.

The instrument that records miles per hour is in reality a recording voltmeter calibrated in m.p.h. rather than in volts.

The energy for operating the speed recorder is derived from an Esterline-Angus permanent field type generator driven by a Valve Pilot contact wheel assembly with its 11.25-in. steel wheel resting on the tread of one of the car wheels. The output shaft of the contact wheel assembly is geared to the generator through a 9/16-in. flexible steel, wire wound shaft in a waterproof casing.

So that the speed recorder will register regardless of the direction in which the car is moving, a directional relay is employed to reverse the polarity of the circuit leading from the generator to the recorder.

Each recording instrument is equipped with two chronograph pens. The left hand pen on all three instruments records time intervals, i.e., seconds, or one-half seconds as desired. The right-hand pen on all instruments records distance that the car moves, i.e., once for each 52.8 ft. or 100 times per mile.

A photo-electric cell is employed to obtain electric impulses each half-second to energize the time interval recording pens. Directed on the light sensitive plate in the photo-electric cell is a small beam of light from a small lamp as used in a regular "pencil" flashlight. The beam of light is interrupted each half-second by a small target one-thousandth of an inch thick, which is fastened to the escapement rack of an eight-day spring wound clock movement which has a beat of one-half second; thus the photo-electric cell is excited once every half-second. The electric impulses from the cell are then passed through electronic amplifier tubes in order to obtain a current of sufficient strength to operate the time interval recording pens.

If it is desired to have the pens record seconds instead of half seconds, a selector switch may be operated which starts a ratchet relay that blanks out each alternate half-second impulse. This relay is necessary since the natural beat of the clock escapement is one-half second and cannot be changed.

Previous experiments had shown that mechanically operated contacts were not satisfactory to obtain time interval recordings due to friction and the impossibility of keeping contact springs in adjustment. Therefore the electronic method was employed.

The other set of pens which record distance travelled by the car are actuated by electric impulses from a rotating contact making device geared to the same shaft that drives the speed recorder generator. When the car moves 52.8 ft. the pens make a mark; therefore, for every 100 marks the car has moved one mile.

Mounted on the control panel above the recording instruments are two magnetically operated Veeder counters. If desired, one of these counters can be cut in with the time interval pens, making it possible to read any elapsed time directly from the counter. The other counter may be cut in with the distance recording pens making it possible to observe distances travelled directly from the counter.

By manipulating a switch the distance recording pens can be switched to a portable push button so that mile post locations may be recorded instead of decimals of a mile.

Alternating current for operating the electronic devices is generated by a rotary inverter under the car.

The recording instrument charts may be driven either by clock movements within the instruments or by electric motors as desired. The motors are mounted on the outside of the instruments and are connected to the chart driving mechanisms by means of electrically operated clutches.

The test equipment may be set for automatic operation so that the charts will not move except during brake applications. By manipulating the proper switches on the control panel the chart drive motors, time interval pens and the distance recording pens may be placed on automatic control. When operating automatically all of the above mentioned devices are static until two lb. of brake cylinder pressure comes on when a sensitive pressure switch closes its contact which starts all of the recording devices and they remain in operation until the brake cylinder pressure falls to two lb.

When using the automatic control it is possible to use fast chart speed at any time without wasting paper during periods between brake applications.

Besides the Esterline-Angus recording instruments, the test rack is equipped with two Savage impact records, one freight train type and one passenger train type, to record intensity of shocks. By coordinating time that shocks occur with time shown on brake cylinder pressure recorder, it can be determined whether or not the brake is used at time of shock.

The operation of the 24 RL and HSC brake equipment is identical with road train conditions, the response being the same as that which follows similar manipulations of the brake on the Diesel-electrics.

For standing train tests, Car No. 50 can be used in place of the locomotive to operate either the conventional automatic brakes or the straight air Electro-Pneumatic brakes. Any demonstration or test made, can be recorded on instruments located in the test section.

When the equipment in Car No. 50 is used in place of the locomotive, the shop or yard air pressure is used for supply or main reservoir pressure, and it is kept reasonably clean and dry by passing it through

a Type F filter, which is part of the air storage system under the car body. This eliminates the air compressor and the usual vibrations through car body that accompanies its use.

An independent brake pipe line is run from the D S E-24-H brake valve in the car to one end of the car where it is fitted with a 1¼-in. cutout cock and special length Goodall semi-metallic armored hose. For train testing, this hose is coupled to the brake pipe on the adjacent car. If train is coupled to the opposite end of Instruction Car No. 50, the regular brake pipe is utilized to run through to the train. This method insures against "mistakes" in the event the special hose is not disconnected at finish of test or demonstration. Until the special armored hose is disconnected, the regular brake pipe cannot be coupled through for required train tests, should Car No. 50 be placed into the body of a train.

If record or test is desired of the operation of the straight air Electro-Pneumatic streamline brake in train service, Car No. 50 may be placed anywhere in body of train. The equipment in Car No. 50 will then function as an HSC car brake instead of the UC Valve under the car body, normally used in passenger service. The air storage system is now used as supply reservoirs and is charged through the dead engine feature of the D-24 control valve, which now functions as a D-22-BR control valve.

Included with the 24-RL and HSC equipments are the train air signal and water raising systems and the New York Air Brake Company's car sanders, which operate in the same manner as the installation on the streamline cars, i.e., the rail is sanded only under the particular car or car truck on which the P-3 Decelostat action occurs. When the rail condition is conducive to wheel sliding and the AP Decelostat system momentarily releases the brake, the sander valve, in response to the Decelostat action, immediately starts sanding the rail for a predetermined number of seconds. Every pair of wheels under the streamline cars is protected from wheel sliding by Westinghouse AP Decelostat equipment.

Rheostats controlling the voltage from the car batteries are used to stimulate the action of the speed generator control of the low, medium and high magnets of the FS 1864 relay valve.

Sixty-four volts from the car batteries operate the 21-B magnet valve, E. P. Master Controller, Overspeed Magnet and E. E. Back-up Valve.

The piping between the various operating valves is intentionally exposed for study and instruction purposes. Certain critical pipes are equipped with drain and cutout cocks to simulate leaking and broken pipes and method of repairs.

The features included in the installation are:

1—Controlled service applications for long trains.
2—Self-lapping independent brake valve.
3—Service safety control (deadman's) feature.
4—Overspeed control—application and suppression.
5—Split reduction service application under safety and overspeed control.
6—Controlled emergency application on long trains.
7—Manual and automatic emergency sanding.
8—Automatic power cut-off in emergency and in safety and overspeed applications.
9—Electro-pneumatic straight air applications.
10—Speed governor control.
11—Decelostat or wheel slip control on cars.
12—Rail sanding following decelostat action.
13—Water raising system on cars.
14—Train air signal system.
15—Electro-pneumatic brake applications from rear car.

For instruction purposes to trainmen and carmen, both styles of signal system car discharge valves are installed and operative. Also operative are the B-3-A, B-3-B and ¾-in. cutout cock style emergency valves, formerly called conductors valves.

The operative brakes under the body of the car, are the UC-2-14-in. by 12-in. equipment for passenger service, and for freight service, standard K-2 and AB equipments are used. The brake rigging is so arranged that one 10-in. freight cylinder operates through the tie rod of one of the 14-in. brake cylinders to apply the brake on one truck. With this arrangement, one slack adjuster only is necessary for each end of the car and it is mounted on the 14-in. by 12-in. cylinders. The adjuster works only when passenger brakes are used.

The brake pipe cutout cocks to the UC valve and to the K and AB valves are alternately closed and opened by one movement of a connecting angle bar to which the handles of the cutout cocks are pinned. When the UC equipment is cut in, the K-2 and AB equipments are cut out and their reservoirs automatically drained. When the position of the angle bar is reversed to cut in the freight brakes, the K-2 and AB reservoir drains are closed and the UC brake is cut out and its reservoirs drained. A target attached to the angle bar uncovers a badge plate reading "freight brake cut in", when the angle bar is positioned for freight service. This target uncovers a badge plate reading "passenger brake cut in", when the angle bar is located in position for passenger service.

The braking ratio of Car No. 50, for passenger service is 85 per cent based on 60 lb. cylinder pressure, and 35 per cent on 50 lb. for freight service.

A group of 3½-in. single pointer test gages in the classroom section are connected to the auxiliary and brake cylinders of the K brake, the quick action chamber, auxiliary and emergency reservoir and brake cylinder of the AB brake, and to the quick action chamber, quick action closing chamber, auxiliary service and emergency reservoir and brake cylinders of the UC equipment. The brake pipe and brake cylinder pressure from locomotive is connected to the 5-in. duplex test gage in center of the above mentioned 3½-in. gages.

There are five pipe lines running from one end of the car to the other. They are: (1) Brake pipe; (2) Signal pipe; (3) straight air pipe; (4) brake cylinder pipe for locomotive brake cylinder connection, and (5) steam pipe (⅜-in. diameter) for connection to locomotive steam chest. A 500-lb. gage in this pipe line is located in observation or instrument end of car.

While the air brake is arranged for separate operation for each truck, the power hand brakes on each end of the car operate the brakes on both trucks.

Twenty-Three Aluminum Sleepers

TWENTY-THREE aluminum sleeping cars built by the American Car & Foundry Co. for three railroads feature the employment of one design with a minimum of variations in some of the mechanical features. Each car has 4 bedrooms and 12 roomettes. Beds are 6 ft. 4⅞ in. long. Monotony is avoided with limited variety of carpets and upholstery.

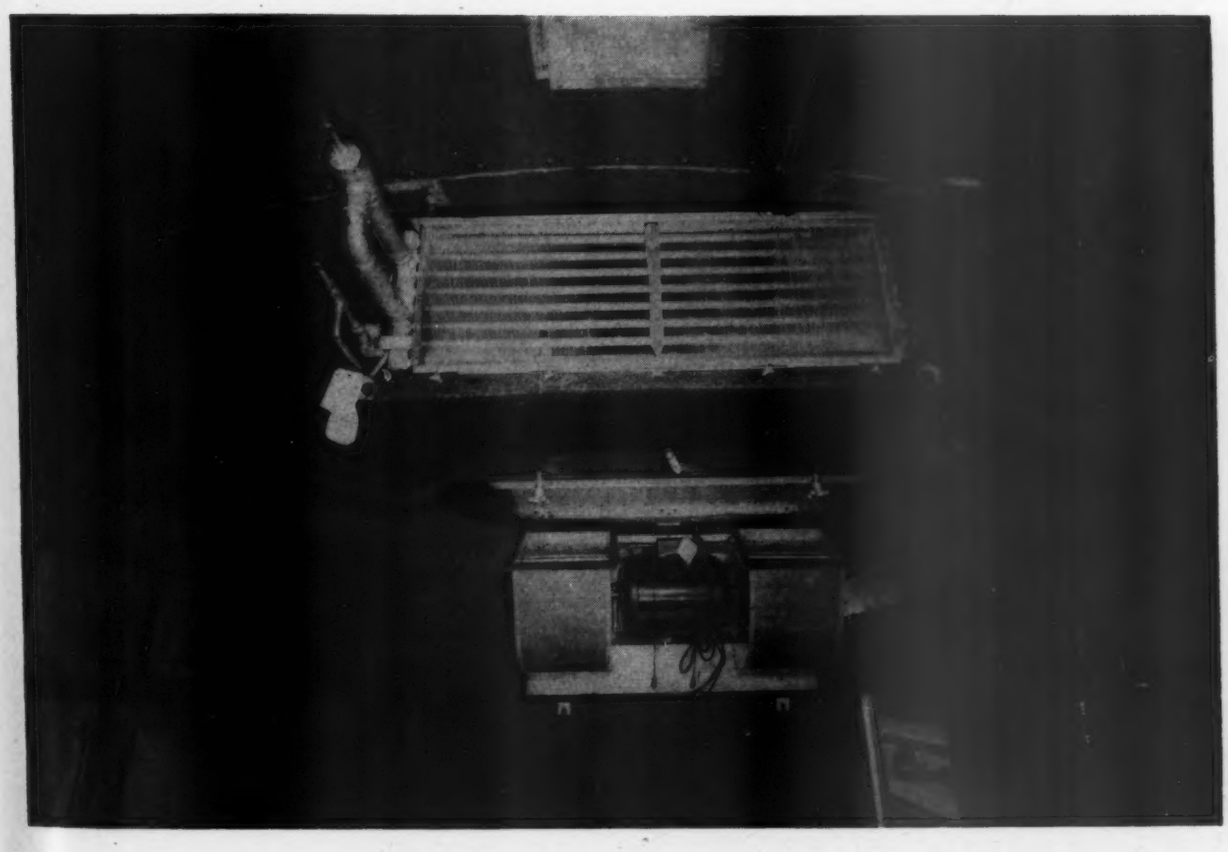
Electric power is furnished by 20-25-kw. G. E. generators on the U. P. cars and by 25-kw. Safety generators on the Wabash and C. & N. W., all 32-volt direct-current system. Spicer drives are employed on the U. P. and C. & N. W. cars; Safety V-belt and gear-case drive on the Wabash. Ampere-hour capacities of Exide batteries are: U. P., 1,176; Wabash, 1,294, and C. & N. W., 1,000.

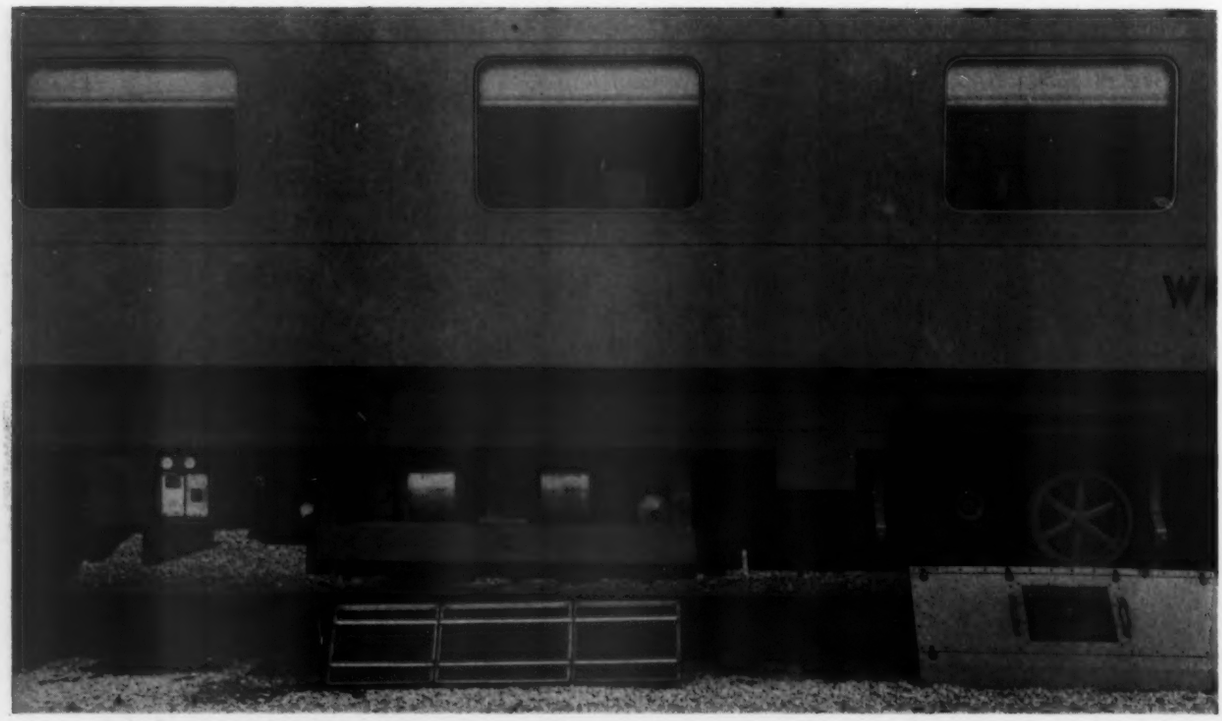
Overhead and Vapor zone-control heat are provided. Brakes are Westinghouse HSC. Average running weight is 160,400 lb.

The U. P. purchased 11, the Wabash 10, and the C. & N. W. 2 of these cars.

Sides, ends and roof are of aluminum alloy—Side frames and roof frames are assembled in jigs as subassemblies and riveted—The underframes have cast-steel combination bolsters, end sills, buffer and draft sills, and low-alloy high-strength steel underframe members—The underframe is assembled by riveting and welding—End posts are open-hearth steel

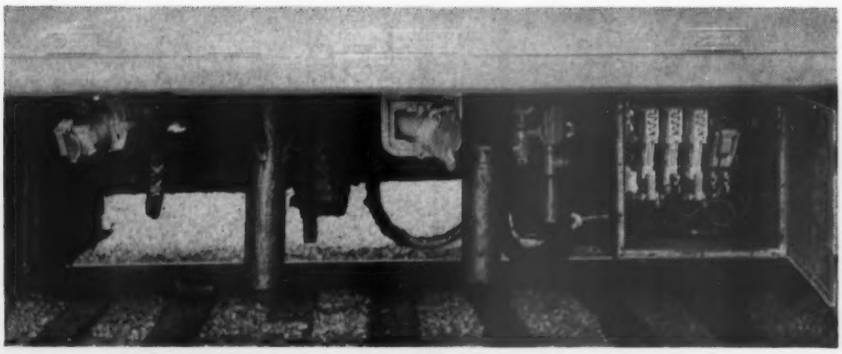
Left: A transverse roomette partition with the coat closet in the foreground—Center: The recess for the bed in the transverse partion—Right: The roomette partitions installed in the car—Below: The air-conditioning evaporator and blower fans before the installation of the ceiling—The blower fans and motor are lowered through a hatch in the ceiling for maintenance by a hinged crank-operated gear device



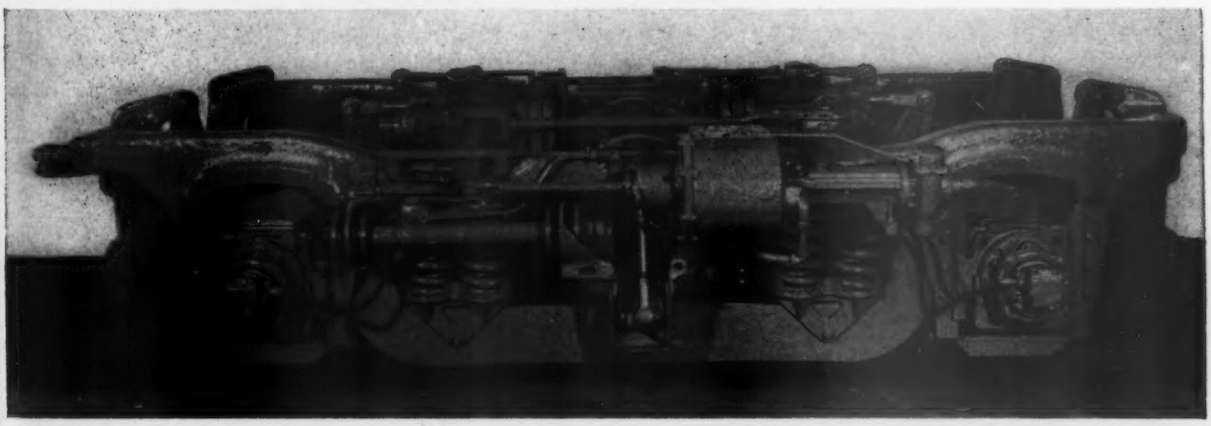


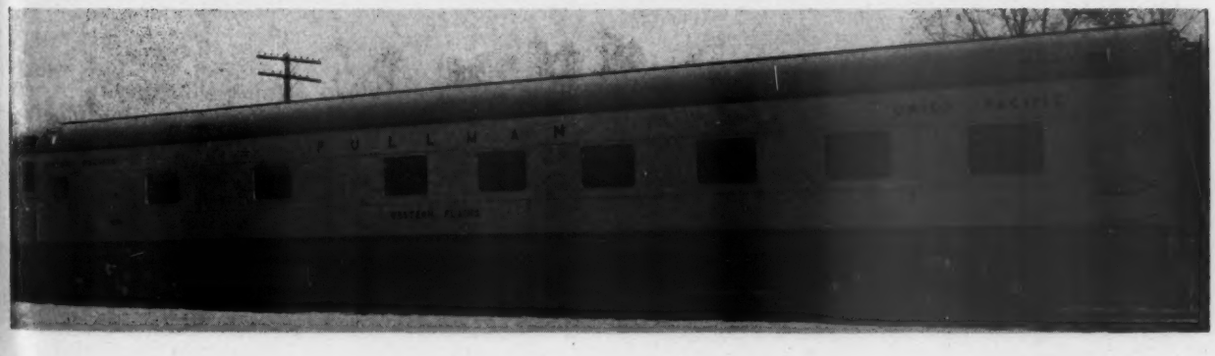
The Frigidaire air-conditioning condenser unit and motor-driven refrigerant compressor—Below, left: Branch circuit control panel and electrostatic filter panel—Center: Train telephone and air-conditioning control panel—Right: Lamp regulator, generator regulator, and braking control panel

Left to right: A battery-charging receptacle, a standby receptacle, and the starter for the motor generator when operated from standby power



Left: One of the batteries in its box with cover lowered for flushing and inspection — Below: Trucks on U. P. and Wabash cars have 9 ft. wheel base; those on C. & N. W. cars, 8 ft. 6 in. wheel base— Hyatt bearings are installed on five U. P. and 2 C. & N. W. cars; Timken on 6 U. P. and 10 Wabash cars





C. & E. I. Has

Own Diesel Club

A DIESEL club composed of men from one railroad, known as the Danville Railroad Diesel Club was organized on October 18, 1949 on the Chicago & Eastern Illinois. The club includes in its membership road men, shop men and supervision, and thereby serves as liaison for the interchange of information on problems involved in all phases of Diesel operation. It acquaints the shop man with the problems of the road man, and vice versa, and it acquaints supervision with the problems of both. The club further serves to familiarize the men of one shop craft with the work of men of another craft, and in this way aids in the co-ordination of maintenance work and furthers co-operation and mutual understanding between workmen of different crafts.

Danville, Ill., was selected as the headquarters for the club because all heavy Diesel repairs are made at that point in a Diesel shop converted from a former steam back shop. The latter is no longer required as the C.&E.I. expects to be fully Dieselized by May 1950. Danville is also a centralized division point on the road and convenient for engine crews.

Officers of the club were elected from the ranks. The president is an electrician; an enginehouse foreman is vice-president and chairman of the membership committee. The secretary is a sheet-metal worker and the sergeant-at-arms an air-brake foreman. The advisory committee is composed of the apprentice instructor and one man each from the machinists, the electricians, the sheet-metal workers, the enginemen and the foremen. The topic committee includes a machinist, an electrician, a sheet-metal worker and an engineman, with a foreman as chairman.

The present membership is about 130, and the average attendance at each evening meeting from 65 to 70. Sixteen members have not missed one of the nine meetings held so far. There are two evening meetings a month from 7:00 p. m. to 9:00 p. m. To accommodate additional road men and the shop men on the second and third trick, two afternoon meetings are held each month from 1:15 p. m. to 2:45 p. m. No dues are charged, all costs being absorbed by the railroad. The railroad furnishes for the use of the club a room 18 ft. by 45 ft., of which 36 ft. is devoted to a meeting room with 75 comfortable chairs, and the remainder used for office space and files. A small area on the floor in the front of the room is used to exhibit parts that have failed in service. The club was also given a 16-mm. sound film projector, a sound strip film projector, a slide projector and a projector lantern.

The club is currently building up a lending library where Diesel literature will be loaned out to members under a system similar to that employed by public libraries. A file of visual aids to education has been built up and includes films from the University of Illinois, the National Safety Council and from manufacturers, and slides from Electro-Motive.

The program for each meeting is selected insofar as possible to include one or more things of interest to each of the shop crafts and to the operating men. A typical meeting begins at seven sharp with an educational movie. This is followed by a brief business meeting, after which a paper is presented either by a C. & E. I. man or by a special speaker. Each meeting includes a case history of an actual Diesel failure that has occurred on the C. & E. I. If available, a film on the general subject of the failure follows the case history. For example, if the failure involved an improperly applied cylinder head, the movie that would follow would be on the proper application of cylinder heads. Questions which were submitted at the previous meeting are answered next and written questions to be answered at the subsequent meeting are collected. The answer to each question is prepared by a specialist on the railroad in the line of work which the question involves. In general, the procedure that will be followed on the main paper is to present talks covering fundamentals of the equipment first; later meetings will be addressed by outside speakers.

The club was founded initially by a group composed of 11 foremen, 21 mechanics, 2 apprentices, 4 road men and 6 men in miscellaneous classifications. Among the first things done was to prepare mimeographed lists of questions for potential members to vote for their preferences on a number of details of the club. The first questionnaire included questions on the preference for the day of the week the meeting should be held, time of starting, number of meetings per month, whether notification was to be by foreman or by bulletin board, how long the meetings should last, whether or not to have a question period, and if so, for how long, etc. The second questionnaire was a follow-up of the first. For example, it asked whether the second and fourth Tuesdays were the best time to meet after these were chosen by the first questionnaire. The response indicated that the interpretation of the answers on the first poll was correct; the second and fourth Tuesday was voted best by a 15-to-1 majority and the 7:00 p. m. starting time by 37 to 1. New subjects included on the second questionnaire collected opinions on whether smoking should be permitted, whether safety pictures are liked, and what type of special picture, e.g., industrial, travel, cartoons, etc., were preferred. It is interesting to note that educational films received the most votes, followed by industrial and travel in the top three classifications.

The membership includes 15 foremen, 17 road men, 14 office men (draftsmen, clerks, management men, etc.), and the remainder men of the shop crafts.

Officers of the Diesel Club looking over an injector held by the apprentice instructor on the C. & E. I.

THE New York Central has recently received from Despatch Shops, Inc., East Rochester, N. Y., a lot of 103 bay window cabooses of modern design. The cars are equipped with Barber Bettendorf swing-motion caboose trucks, Waugh twin cushion draft gears and swivel yokes and couplers. All the cabooses are of all-steel construction with panelled steel roofs. Steel lining is used in one hundred of the cars and plywood in three. All have high-tensile steel end crash posts, 2-in. insulation in the side walls and floors, and 3-in. roof insulation with reflective paper to combat the sun's rays.

The bay windows, with top or hood of one piece, have aluminum frame sliding windows protected with copper screening. Reversible passenger-car type seats are installed in each bay window, affording comfortable full length view of the train while in motion. Car by car observation for hot boxes or other train hazards can be made when the train is rounding a curve and is viewed from the bay window to the inside of the curve, thus affording greater protection in train operation.

The 8 in. high-tensile I-beam crash post, together

TABLE I—PRINCIPAL DIMENSIONS OF NEW YORK CENTRAL CABOOSES BUILT BY DESPATCH SHOPS, INC.

Length inside, ft.-in.	33-7
Length over coupler pulling faces, ft.-in.	44-0
Width inside, ft.-in.	8-5 3/8
Width inside, at bay window, ft.-in.	10-0 3/4
Width over bay window, ft.-in.	10-8
Height inside, ft.-in.	7-3 1/8
Height, rail to top of floor, ft.-in.	3-9 1/16
Height, rail to top of running board, ft.-in.	12-2 9/32
Length from center to center of trucks, ft.-in.	24-11
Truck wheel base, ft.-in.	5-8
Width over platform steps, ft.-in.	9-7
Light weight, lb.	53,500

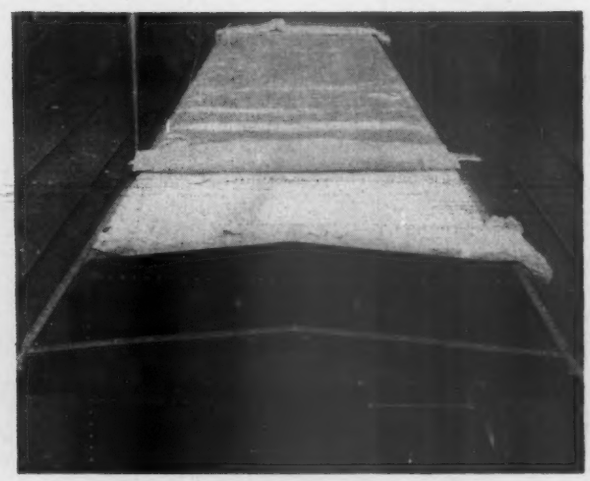
The bay windows have aluminum frame sliding windows

Bay Window Cabooses

with the heavy end plate and bolster floor plate construction, provide greater protection to train crews against end crashes. The end platforms and steps are made of safety grip steel plates.

The increased length over the old wood standard gives greater interior comfort. Increased locker space has been provided, also the latest in refrigerators for food storage, and dry food storage lockers. All interior parts have rounded corners to protect the crew against injury in instances of jars on the road. All operating handles for lockers, etc., are recessed flush with exteriors. A two-tone interior paint job adds to the generally pleasing interior effect. Spring cushion bunk mattresses also increase the comfort of the crews.

Over 2,600 fabrication operations were involved for each car. The underframe was built at 7 stations: (1) Fitting the center sill on the striker casting, bolsters center fillers, diaphragms and spreaders; (2) reaming for fitted parts; (3) welding the Z sections together; (4) driving the rivets in the fitted parts; (5) fitting bolster crash plates and stringers: (6) reaming the holes for the bolster crash plates and stringers; (7) driving the bolster crash plate and stringer rivets. The sides, ends and roof were prefabricated and required application only to the underframe.



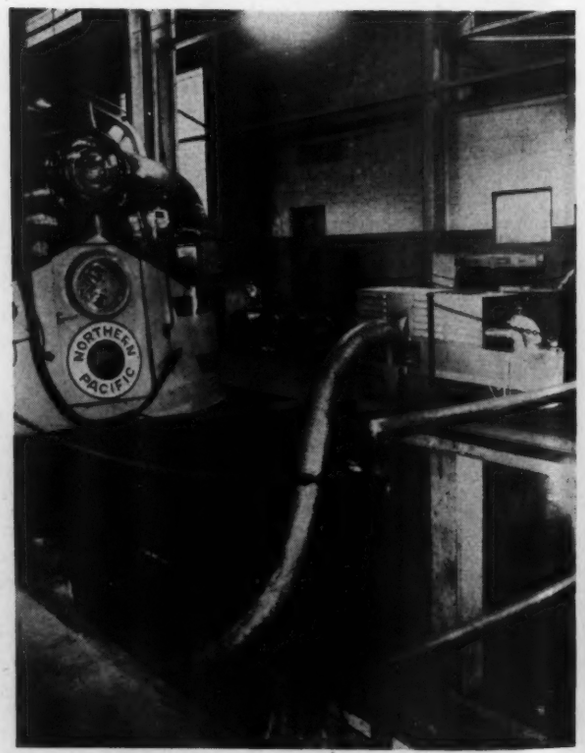
Right (top to bottom): The safety grip end platform and steps; the underframe; the roof insulation with reflective paper to combat the sun's rays—Below: Side and end insulation applied

De-icing Diesels In the Shop

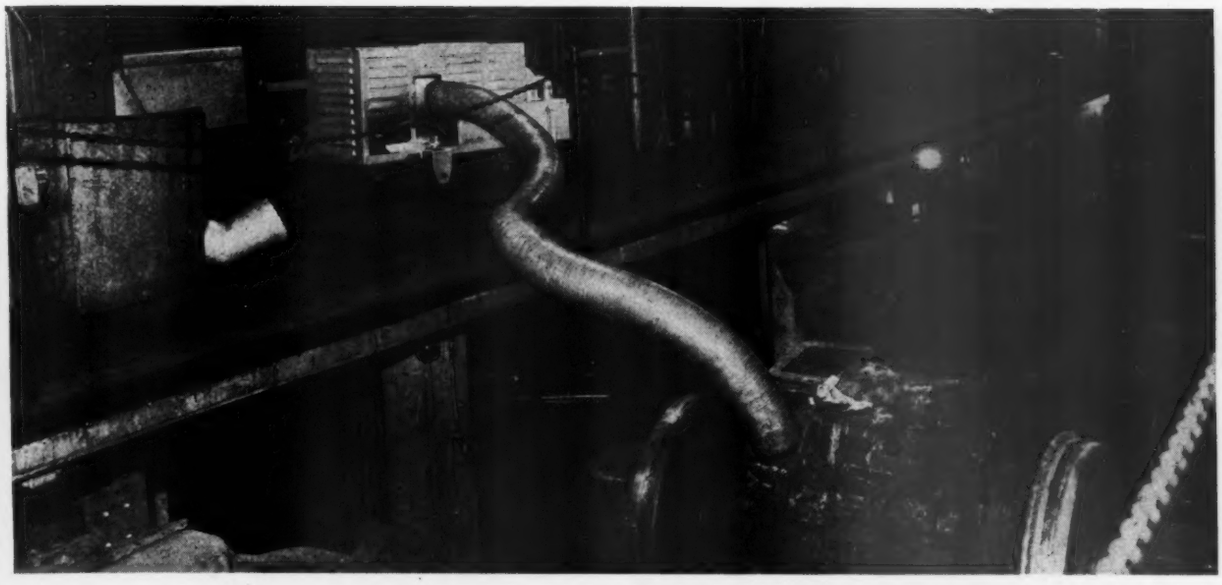
SEVERE winter conditions in the Northern states were instrumental in influencing an installation of portable heating equipment in the shops of the Northern Pacific which is shown in the accompanying illustrations and used for de-icing and thrawing passenger car trucks and interiors; de-icing and drying Diesel locomotive underframes, trucks, traction motors, control cabinets, etc.

This same type of equipment has been sucsessfully used for heating small enginehouses and for the de-icing of refrigerator cars and drying box cars after washing. This type of equipment was originally designed in a vertical type for "firing" citrus orchards in California and the present design which is shown here has been turned on its side, equipped with wheels and otherwise designed for easy portability for almost any emergency heating or drying operation.

The heating unit consists primarily of a combustion chamber, blower unit, gauges, controls and a 30-gal. tank with more than ample capacity to hold the 20 gal. required for eight hours operation with-



Above: Drying the control panel in the interior of a Diesel locomotive—Right: How hot air is delivered to parts under a locomotive



Use of Hy-Lo heater with 8-in. flexible metal tube in drying a traction motor

out refueling. The blower is normally driven by a G. E. 1-hp. electric motor, but a Briggs & Stratton, 1.5-hp., 1-cyl., 4-cycle, gasoline engine may be used if electric power is not available. Air delivery of 1,500 to 1,600 cu. ft. per min. at 250 to 300 deg. F. is equivalent to 300,000 B.t.u. per hr. with a fuel rate of 2¼ gal. per hr. of domestic fuel oil or kerosene.

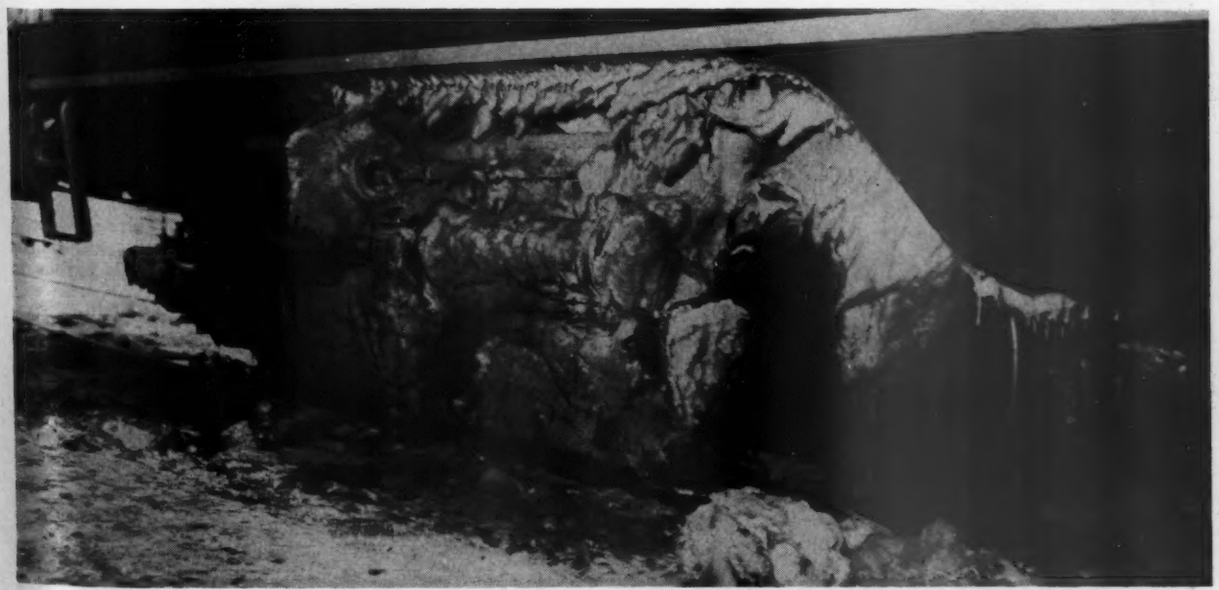
The induced draft vaporizing principle used is simple, eliminating the need for fuel pumps, filters, atomizers, valves, jets, and other complicated parts.

With this heater it has been possible by directing hot air into the rotor of the traction motor, to dry the entire assembly in about 30 to 45 min. after which the motor can then be worked on immediately. This compares with a day or more needed under ordinary conditions to dry inside of traction motors.

The heater has also been used to melt ice and snow from the underframes of locomotives and cars in about 30 min. as compared with much longer periods by natural melting which frequently leaves underframes and trucks dripping water for several hours and almost requires repair men working underneath to wear rain coats.

This equipment, developed by the Scheu Products Company, Ltd., Upland, Calif., is known as the Hy-Lo Hotshot forced-air portable heater.

Ice conditions on passenger car truck which make the use of some type of heating device almost imperative



ELECTRICAL SECTION

Fluorescent Enginehouse Lighting

New York Central installation at Englewood, Ill., shows how this type of lighting may be used to meet the difficult conditions imposed by an enginehouse servicing steam locomotives

The entire side of the locomotive is bathed in light

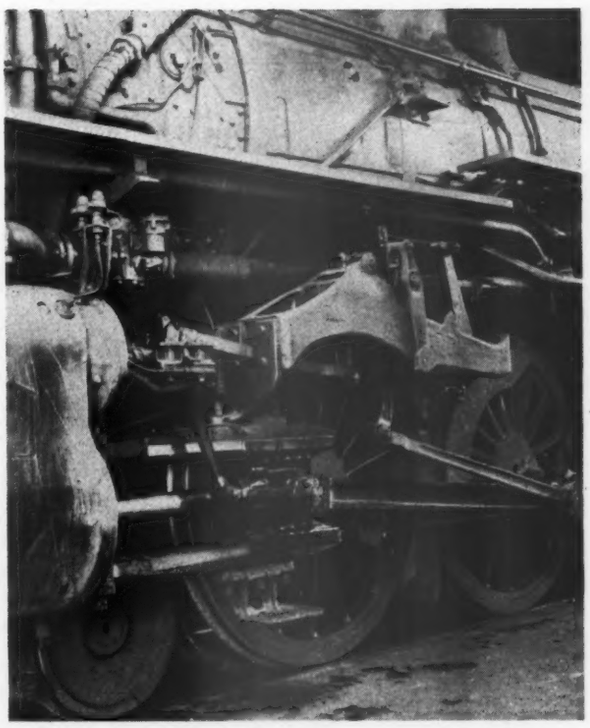
A FLUORESCENT-LIGHTED enginehouse with plenty of light has been proved to be practical by the installation of such a system in the New York Central's enginehouse at Englewood, Ill. Adequate switch arrangements permit the use of light where it is needed without unnecessary use of electric power.

This enginehouse is equipped with direct steaming, and locomotives in the house are kept hot on steam from the power house and are fired as they leave the house.

Lighting between stalls is supplied by 12 fixtures arranged as shown in the drawing. There are two 60-in., 100-watt lamps in each fixture. Reflectors are flat to permit light to reach the tops of locomotives with a low fixture mounting height. This distance, from top of rail to the lower edge of the fixtures, is 15 ft. The distance between center lines of fixtures at the inner portion of the stall, where there is a single line of fixtures, is 16 ft. In the outer part of the stall, where there are two rows of lighting units, the distance between fixtures is 20 ft.

The fixtures are suspended from $\frac{3}{8}$-in. stranded copperweld messenger wires strung from the inner to the outer wall of the house at a height of 20 ft. The supports between the fixture and the messenger are $\frac{3}{8}$-in. iron rods which have a 3-in. hook at each end. The branch feeders, which consist of No. 10, 2-conductor, non-metallic cable, are suspended from the messengers by wire cable hooks. There is an outlet box clamped to the messenger above each fixture and the branch feeders are run through these boxes. There is an outlet in each junction box, and connection from the fixture to the box is made by a 2-wire cord and a finger-grip plug.

To remove a fixture for cleaning, it is only necessary to pull the plug from the junction box receptacle and unhook the fixture from the messenger. A portable stand is used for cleaning, and the fixtures are cleaned on the stand after they have been disconnected and taken down.

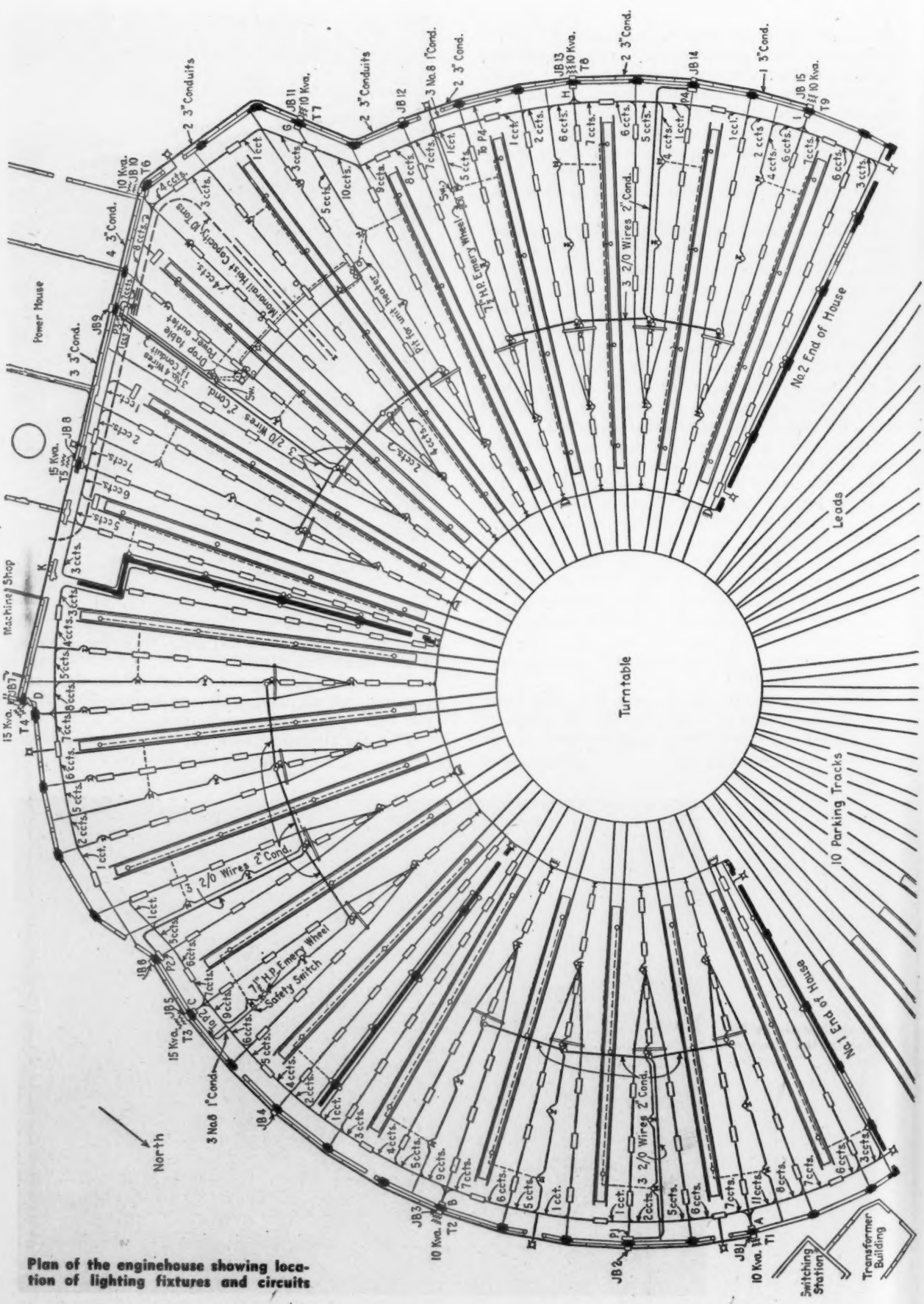


Details of the running gear are shown up by the lighting

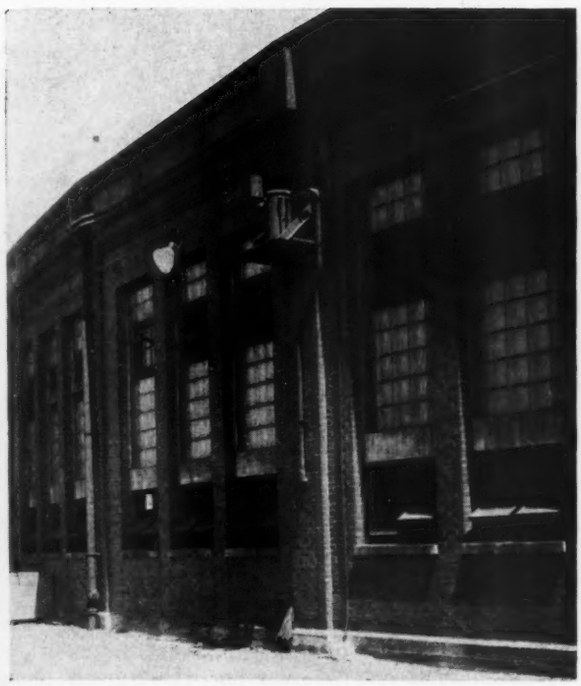
The outer-circle-runway is lighted by the same type of lighting unit, with one fixture 7 ft. from the wall at the end of each track.

Pits are equipped with duplex convenience out-

General view of the interior of the enginehouse



Plan of the enginehouse showing location of lighting fixtures and circuits



Arrangement of feeders, junction box, lighting transformer and outside bracket light

The light reaches over the top of the boiler

lets with hinged covers for plugging in portable lamps, the longitudinal distance between outlets being 40 feet.

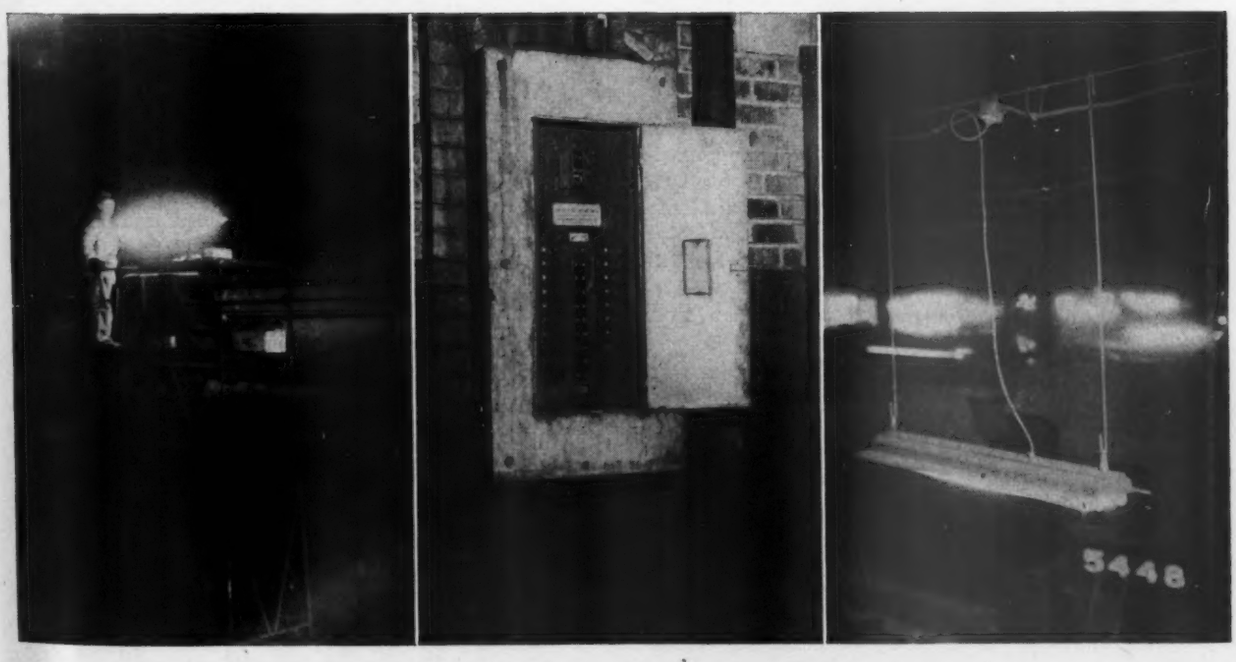
The 50-ton drop pit is lighted by pit lights embedded in the concrete walls on both sides and both ends. The lights on the side walls are staggered, the longitudinal distance between opposite lights being 20 feet.

There are six, 500-watt floodlights which light the turntable area. These are mounted at equal distances apart on the inner wall near the roof. Other outside lighting consists of 200-watt lamps in angle reflectors, mounted above doorways. There are two of these on each end wall, and four on the outer circle wall.

Wiring

Feeders carrying 440-volt, 3-phase power are run in 3-in. rigid metal conduit, on the outside of the outer circle wall under the eaves. Lighting feeders are 2/0, and power feeders are 4/0 rubber-covered cable. Four junction boxes on the outer wall provide

(*Continued on page 209*)



Left: The portable stand used for cleaning and relamping—The short step ladder permits a man to reach the plug—Center: Lighting distribution panel—Right: The suspension of fixtures from the messenger and the plug connection make removal for cleaning easy

Solderless Commutator Joints for Railway Traction Armatures*

Armatures with silver-plated riser slots and coil ends can apparently meet all the mechanical and temperature requirements of the new designs of motors using Class H insulation

By J. R. Reed†

THE advent of the Diesel-electric locomotive and its rapid large scale acceptance by the railroads of this country have brought to the fore many problems for which solutions must be found. Among the problems related to this tremendous increase in heavy d.c. electric traction equipment is that of adequate joints between coil leads and commutator bars in motors subjected to severe operating conditions. This is a problem of long standing in motors operated at high temperatures, but it has become much more acute with the development and use of insulating materials that will withstand more and more heat. The first substantial increase in permissible operating temperatures of such equipment was brought about a number of years ago by the introduction of full Class B insulation to replace the then standard Class A or composite insulation. This permissible temperature has now been further increased by the acceptance of Class H silicone[1] insulation as standard in certain types of traction motors.

For traction motors operated at normal temperatures, the conventional solder joints between coil leads and commutator bar made with lead-tin alloys have proved satisfactory when an area large enough to provide a satisfactory conductivity of the joint is available. However, as operating temperatures have increased in value, and design restrictions have decreased the available space for the commutator joint, the factor of safety thus afforded has been reduced to the danger point. This paper describes a method of entirely eliminating easily fusible material from joints of this type.

Effect of Higher Temperatures on Solders

As noted above, the chief source of difficulty in commutator joints is high temperature of operation. All lead-tin solders between 2½ per cent and 85 per cent lead with the single exception of the eutectic alloy (37 per cent lead) have what is known as a plastic range. This is a range of temperature over which the alloy is in the form of a mush or suspension of unmelted crystals in molten metal. This is shown graphically in the lead-tin constitution diagram, Fig. 1. At temperatures above this range the alloy is completely liquid, and at temperatures below it, the alloy is completely solid. The eutectic alloy melts abruptly at the lower limit of this range which is constant for all alloys of these two metals within the limits mentioned above. This temperature is 361 deg. F. It is at this temperature that these lead-tin alloys soften and begin to flow; and thus, it is at this temperature that the mechanical protection of any lead-tin solder is lost or greatly impaired regardless of the hardness of the solder.

In armature work where full Class BBB windings are used with a permissible operating temperature up to, or even in excess of 300 deg. F., it is obvious that a solder which gives little or no protection above 361 deg. F. leaves a negligible factor of safety for overload or other unusual conditions. This situation

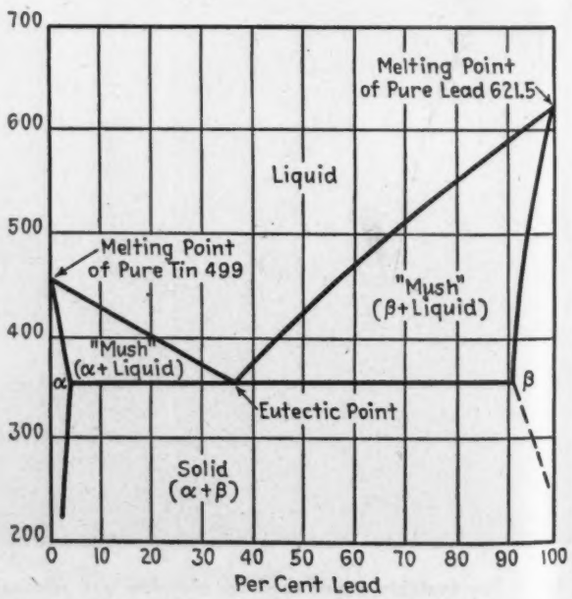


Fig. 1—Lead-tin constitution diagram

* Paper presented at the Winter General Meeting of the American Institute of Electrical Engineers held in New York, January 30 to February 3, 1950.

† Resident engineer, National Electric Coil Company, Los Angeles, Calif.

is further aggravated by the possibility of a high resistance electrical joint which will cause still additional heat to be generated in the contact area of the solder.

For this reason, it has been customary to use solders with higher melting points for this class of work. Unfortunately, however, such solders are very limited in both availability and desirable properties. The most satisfactory of these has been a solder consisting of pure tin or 95 per cent tin and 5 per cent antimony. Both of these solders give protection to approximately 450 deg. F. and are quite satisfactory for use where temperatures never exceed this limit. With the pure tin, the plastic range is entirely eliminated, and in the case of the tin-antimony alloy, it is reduced to a range of about 5 deg. F. Because of the desirability of some plastic range for ease of working, the tin-antimony alloy is most popular where hand soldering is employed. In addition, the antimony is thought to give a solder which will alloy to a great extent with the copper being soldered, thus giving a better joint. Pure tin is used principally in solder-pot applications. These are the two solders most widely used in present practice on heavy, high-speed Diesel electric traction armatures.

Even though pure tin or tin-antimony solders used with care in either hand soldering or pot soldering give a joint which is reasonably satisfactory for armatures insulated with standard Class B components and operated at normal temperatures, they are not adequate for armatures insulated with Class H (silicone) components and operated at the still higher temperatures consistent with this type of insulation.

At present, temperatures are often attained in the operation of these armatures which exceed the melting point of this type of solder. In fact, well over 50 per cent of all armatures returned to the shops of at least one large railway have high resistance commutator solder joint readings, and over 20 per cent require resoldering. Because of this, much work has been done to develop a solder with a still higher melting point. A number of these solders have been produced and used, particularly during the recent war when the use of tin was restricted; but, for a number of reasons they have not been satisfactory.

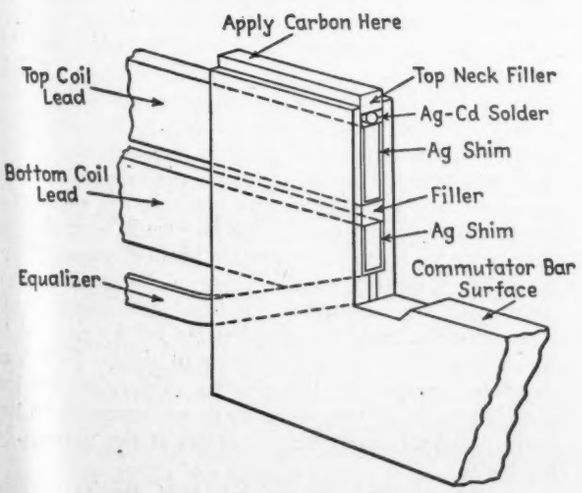


Fig. 2—Sketch showing the use of the silver shim to tighten the coil leads in the commutator risers. The silver-cadmium solder is used to bond the top filler to the commutator risers

High-Temperature Solders

Most of the high temperature solders are primarily high lead solders. Analyses of two solders in this class are: lead 87 per cent, silver 1.50 per cent, bismuth 0.50 per cent, antimony 0.50 per cent; and lead 97.25 per cent, silver 2.50 per cent, copper 0.25 per cent[3]. The first of these has a plastic range of 540-548 deg. F. and the other has a plastic range of 550-580 deg. F. Although the melting points of these solders indicate that, from the standpoint of temperature, they are satisfactory for most applications, they still do not leave much factor of safety under present operating conditions even if they are applied with perfect results.

In practice, this type of solder is extremely difficult to use with consistently satisfactory results. This is primarily because of the poor spread factor, characteristic of high lead solders. The spread factor is defined as the area in square centimeters that will be covered on clean copper when one gram of the solder is melted completely. This factor for the high lead solders averages only about one-fifth that of the high tin solders. For this reason, these solders are extremely difficult to flow into contacts where there is even a reasonably tight fit, such as is the case with high-speed traction armatures. However, they can be, and in fact, are being used with good results in certain types of d.c. armatures where space requirements and general design are more liberal. They are also used with good results in soldering steel wire coil retaining bands.

In the case of a particular high-speed Diesel electric armature, the electrical conductivity of the commutator joint is only about 1.5 times that of the armature bar, even when a perfect solder job has been accomplished with this type of solder. In practice, however, it has not been possible to obtain consistent soldering results which will give assurance of more than half of this amount, and even this requires careful attention to all details of cleaning, fluxing, and soldering operations with high-lead solders. For this reason, it is not possible with these high temperature solders to obtain connections in the high-speed traction armatures under discussion, which will be consistently low in electrical resistance. As a consequence of this, heat in excess of the operating heat of the armature is liberated in the very joint which is particularly vulnerable to the effects of the high temperature; and a considerable part, if not all, of the advantage of the higher melting points of the solders is thus nullified. Furthermore, these solders are subject to oxidation as the temperature is increased, and the tendency is to eventually produce joints of high electrical resistance. In severe operation, this brings on a vicious circle of events.

Although the use of other solders in the high temperature range has been attempted, this has been without much success up to the present time. This is primarily because of the difficulty of getting an alloy which will flow readily into the small spaces involved and adhere properly to the copper bars with fluxes

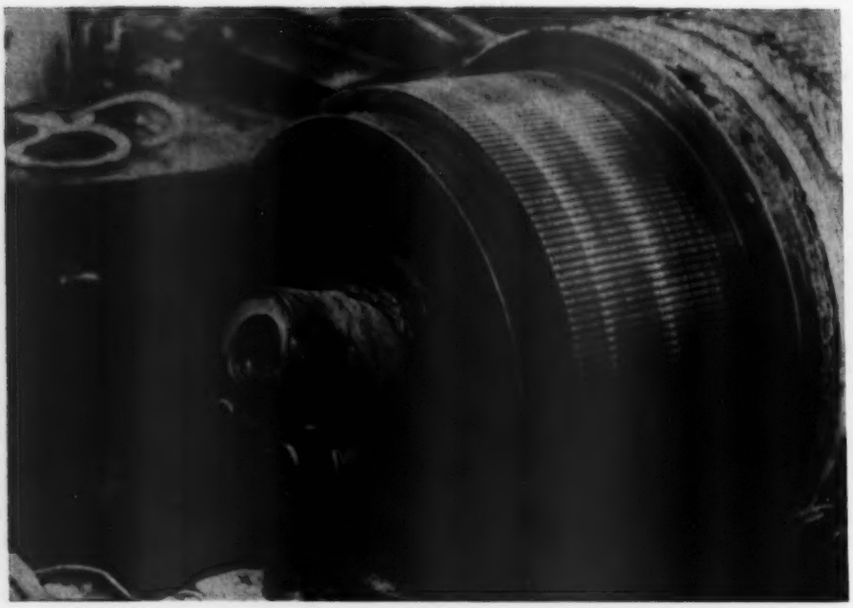


Fig. 3—Result of a bearing failure which allowed the armature to rub on the pole pieces and wreck itself

that are available for soldering operations on electrical apparatus at these relatively elevated temperatures.

Brazing

Tests were made with low temperature brazing to determine if this might not possibly be a satisfactory solution to the problem. This was ruled out, however, by a number of factors. Chief among these is that the temperatures involved are destructive to the commutator insulation where such a sizable joint must be made so deep in the commutator bar as is the case with short riser bars characteristic of high-speed traction armatures where equalizer coils must often be connected actually below the level of the commutator surface. In addition to this, the work involved in milling out these connections, even if they were feasible, would so increase the cost of a subsequent rewind that this alone would make the method prohibitive.

Silver Plating

With brazing thus ruled out, and since no suitable solder in the temperature range above 600 deg. F. and below 700, or possibly 750 deg. F. was available, tests were undertaken to determine if a suitable soft joint could be obtained by the use of silver plating and the complete elimination of a fused connection. With this in mind, two sets of special armature coils were manufactured, incorporating a heavy silver plated lead section in place of the then standard tinned leads. Two armatures were prepared for these coils and the commutator risers were thoroughly cleaned of all residual solder and tinning by means of a pneumatic disc sander with fine grit. Care was taken to preserve as nearly as possible the original surface of the copper bar and to avoid an irregular surface which might interfere later with the plane surface contact which it was hoped would be obtained.

After the risers were thoroughly cleaned in this manner, the inside surfaces of the riser slot were silver plated by means of a portable silver plating apparatus using controlled direct current and a silver cyanide electrolyte. The current was controlled by means of surface pressure and voltage so that as nearly as possible, a bright plate was obtained. The silver was built up to a thickness of approximately .0005 in. and the commutator thoroughly cleaned with pure water and then baked and tested for resistance bar-to-bar. Satisfactory cleaning was achieved with the first attempt.

Armatures Without Solder

Following this preliminary preparation, the armature was wound in conventional manner with the special coils, with the exception that the commutator risers were blocked ahead of the leads being laid, and the connections were shimmed to produce a very tight circle of the risers. The material used for this shimming was fine silver shim stock rolled to a thickness of .003 in. and inserted in approximately every fourth or fifth riser as was needed to maintain the tight fit. The silver was used in the annealed form and was inserted as a 'U' piece placed around the coil lead as it was driven into place in the commutator riser, as shown in Fig. 2. The leads were driven into place as tightly as possible without causing appreciable upsetting of the copper. No shims were used with the equalizer winding, and these leads were actually upset into the bottom of the riser slots so as to produce a tight fit without shims. This was possible because of the relative difference in the dimensions of the equalizer leads as compared to the main coil leads and their location at the bottom of the slots.

As the winding progressed, first the equalizers and then the bottom main coil leads were mudded in with inorganic-filled silicone compound. This material was used to completely fill the space back of the

Fig. 4—Close-up of commutator risers of the armature shown in Fig. 3. Even though commutator temperature was raised to approximately 700 deg. F. or more, as was evidenced by the melting of the cadmium-silver solder in the top fillers, no damage was done to the riser connections

risers so as to preclude the possibility of varnish getting into the joint in subsequent impregnation. Finally as the top coils were laid as described, the remaining space behind the risers and the spaces at the ends of the cores were filled with inorganic-filled silicone compound and the armatures hot banded and wedged.

After checking the armatures for resistance in the standard manner, the remaining space in the riser slots above the top coil leads was filled in for mechanical reasons and to present a smooth contour. In the first armature this was done by brazing a copper filler into the opening with a phosphorous silver alloy material. However, as previously pointed out, this introduced the rather serious problem of stripping the armature for subsequent rewinding, and although this has not yet been done, it is evident that a softer filler would be of considerable advantage from this standpoint. For this reason, the second armature was finished by soldering the top filler into the risers with a special alloy consisting of 95 per cent cadmium and 5 per cent silver, and having a melting point between 640 and 740 deg. F. This solder was heated by incandescent carbon applied from the top under pressure and was fluxed with an acid type flux used very sparingly. Actually, a small piece of the soldering alloy was placed in the slot under the filler which was deep enough to extend above the top of the risers. The carbon was applied to this filler and held until the solder melted and the filler settled into its place, Fig. 2. The results obtained in this way were very satisfactory and produced a mechanically strong bond at the top of the risers to prevent radial movement of the coil leads. The fillers could still be driven out much as the standard soldered fillers, and did not require milling or sawing as did the brazed fillers. A simple jig and carbon holder was arranged so that very little time was required for this operation.

Both armatures were vacuum pressure impregnated in the usual manner with the exception that special precaution was taken to prevent the varnish level in the tanks from coming up over the risers during the process. Final tests were completed and the resistance readings, indicating the relative conductivities of the commutator connections, showed them to be completely uniform and fully as low as the best of the solder jobs which were being tested with the same equipment.

Performance of Armatures in Service

The two armatures were placed in different high-speed passenger locomotives—the most severe application available. Both armatures were returned to the shop after approximately sixty thousand miles, at which time they were put through the regular shop tests. Both armatures were especially checked to determine if there had been any changes in the commutator joints. Resistances were checked and found to be the same as when first applied and completely uniform with no high readings. After routine cleaning and checking, the armatures were again put out into the same service as before. The first armature to be rewound has not been shopped since this first time and should have a mileage well in excess of 300,000 miles at this writing.

The second armature, however, was returned again after an additional 50,000 miles when the second locomotive to which it had been applied was shopped for an annual overhaul. At this second shopping, the armature was again checked carefully and all resistance readings were found to be excellent and uniform, indicating that there had been no deterioration in the conductivity of the riser connections. There was no evidence of any excessive or localized heating as is evident in a majority of soldered armatures operated under the same conditions, even though they may not have failed. After routine cleaning and checking and reimpregnation, the armature was again placed in service on a similar locomotive where it remained in service for an additional 95,000 miles. After this additional mileage, it

was returned to the shop following a complete bearing failure which allowed the armature to drag on the pole pieces and wreck itself, as is shown in Figs. 3 and 4. This failure, after 206,000 miles of severe service, was not in any way the result of a winding failure, but was caused by a mechanical failure.

Fortunately, the commutator risers were not destroyed by the failure and were left in excellent condition for detailed inspection and study. At the time of the failure, the temperature of the commutator was in excess of 700 deg. F. as was evidenced by the fact that the cadmium-silver solder in the top fillers had melted and run. All of the external varnish had been charred or entirely burned out. The glass base Bakelite wedges had been charred or entirely burned out. In spite of this, as was to be expected, the riser connections showed no signs of damage from the heat. There had not been any movement of the bars in the risers even at the time of failure, though the coils had been thrown from the slots in about one quarter of the armature and had dragged on the pole pieces.

After external inspection, the coils were cut off behind the risers and the risers themselves carefully stripped to study the nature and condition of the contact. It was found that during operation there had been some cold welding of the silver surfaces in all of the slots and considerable in some of the slots, especially on the equalizer coils.[4] This latter was probably due to the tighter fit of the equalizers caused by the upsetting of the copper during winding. This caused a much higher contact pressure in the constricted bottom portion of the riser slot than was obtained in the less restricted upper portions of the slots where the coils were merely wedged tightly. Some of the equalizer leads were welded so tightly that they required sawing to remove them from the slots.

There was only slight evidence of oxidation of the contact surfaces, and in no case was there any evidence of contact burning as so frequently takes place in soldered connections. There was considerable varnish in many of the contacts. This was probably due to capillary action during impregnation, by which the varnish filled the open spaces in many slots leaving free only those surfaces that were actually in solid contact. This condition should be prevented or at least minimized by more care in sealing behind the commutator before impregnation. It may possibly have been caused by improper care in one of the impregnations to which the armature was subjected during its life, and greater care in this respect might also be indicated. Actually, the presence of a varnish film in a portion of the contact area is of little consequence, because conductivity equivalent to that of the armature bar can be maintained in the commutator contact, if over 90 per cent of the available area is unused. In other words, with silver-to-silver contact, the designed factor of safety of the connection with respect to electrical conductivity is about 15 as compared to approximately 1.5 for a perfect solder contact.

In addition to this much greater factor of safety is the fact that silver oxide between silver surfaces breaks down to pure silver at temperatures above 356 deg. F.[5] For this reason, it seems that electrical conductivity of the silver joint would be improved materially following subjection to temperatures which would destroy a soldered contact. These higher temperatures, if they were attained, would also tend to destroy any varnish film that might be in the contact. It also seems that repeated oxidation and reduction of even a portion of the silver surfaces accelerates to a large degree the welding of the silver to a more solid contact. This, of course, would complement the natural cold welding characteristics of the silver which are also accelerated as the temperature is increased.

As a further practical test of this type of commutator connection, it is proposed that another ten armatures be wound in this manner and put into service under severe operating conditions as were these two. Certainly there will be refinements in technique to improve the contacts as well as to reduce the labor involved in making them. The use of new or rebuilt commutators manufactured with silver plated riser slots in place of tinned slots would be a big step in this direction. However, even with the present methods described in this paper, it is expected that a definite saving can be shown in labor as compared with standard soldered joints.

On the basis of the preliminary tests which have been conducted, and on the basis of the performance of the two test armatures in actual road service, it seems safe to conclude that this method of making commutator connections, although a radical departure from accepted practice, offers a practical step toward the much needed solution to the problem of furnishing a satisfactory connection between commutator and coils for operation at temperatures above the limits of soldered joints in equipment which does not lend itself to the application of brazing. The problem, as stated in the first of this paper, is becoming increasingly acute as insulations are being adopted which will materially increase the temperature limits for traction armatures. Even with the present standard insulations a high percentage of electrical failures are caused by weaknesses of soldered connections. The high percentage of failures will certainly increase rapidly with each small increase in loading made possible by improved insulation if steps are not taken to correct the condition.

Acknowledgment

The investigation of solderless commutator connections was made by the author at the San Bernardino, California shops of the Atchison, Topeka & Santa Fe Railway. The author expresses his indebtedness to the Atchison, Topeka & Santa Fe Railway for its valued assistance, general supervision, and making possible the investigation and road testing; and for permission to submit this paper.

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5. Silver in Industry—Lawrence Addicks—Rheinhold Publishing Co., 1940, page 187.

Lights—Sealed-Beam And Fluorescent

The photograph shows an Erie passenger train hauled by a G.E.-Alco Diesel-electric locomotive entering the new Erie station at Shaker Heights, Ohio. The locomotive is equipped with two 30-volt, 200-watt, PAR-56 sealed-beam headlights. This was accomplished by removing the reflector from the original unit which carried a 250-watt, 32-volt conventional headlight lamp and installing a Pyle-National twin sealed-beam adapter having a three-point suspension. Lamp replacements are easily accomplished by releasing two wing nuts at the top of the rear of the adapter from the inside of the locomotive nose. Releasing the two wing nuts permits placing the adapter in a horizontal position. After the lamp is replaced, the adapter is turned to the original position. Refocusing is unnecessary.

The combined candlepower of the two sealed-beam units is approximately 400,000. This is a little more than 50,000 c.p. greater than that obtained from a standard 14-in. reflector with a 250-watt, 32-volt, P-25 bulb headlight lamp. Candle power maintenance of the sealed beam lamps is better than 95 per cent of initial candlepower throughout life as compared with about 80 per cent for a 250-watt, 32-volt, P-25 lamp. Total life of the sealed-beam lamps is also greater.

The station shown in the photograph is relatively new and is equipped throughout with fluorescent lighting.

Blueprint Holder

*W. E. Abbott**

The two pictures shown here are of a device for use with the long blueprints made by the General Electric Company for the electrical circuits of Diesel-electric locomotives.

The blueprint mounted on the device is about 13 ft. long by 11 in. wide. Once the print is mounted, it need not be touched with the hands and thus does not become soiled, and any section of the print can be brought into view very quickly, and any circuit running lengthwise with the print can be followed across the print.

The rollers are made from a 24-in. length of stove pipe cut into two 12-in. lengths. Sheet iron discs are secured in both ends of each roller. The discs at the front end are flush with end of roller as shown in Fig. 1, and are set in 1 in. from the back end as shown in Fig. 2.

The turning knobs shown in Fig. 1 are locked on a ⅜-in. bronze rod which is the shaft. This shaft is attached to the roller by a bracket clamp at the back end in the recess formed there by the disk being set in. The right-hand pulley, shown in Fig. 2, is attached and locked to the shaft. The second

* New York Central, North Bergen, N. J.

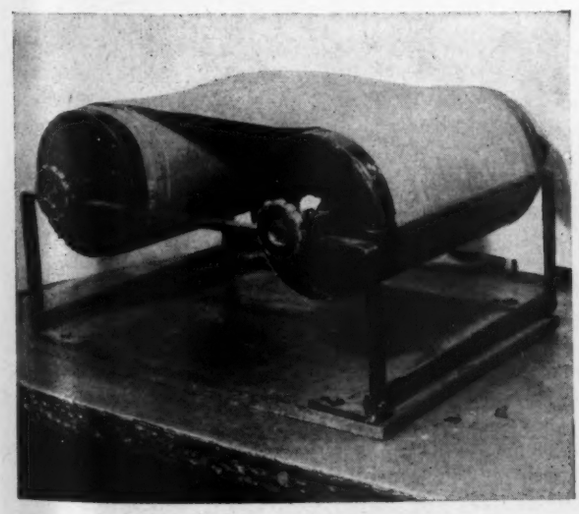


Fig. 1—Front view of holder for handling long blueprints

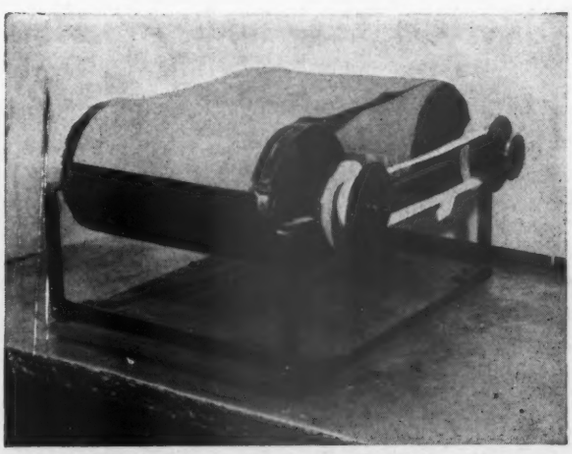


Fig. 2—Back view of the device showing belt and pulleys coupling the two rollers

pulley can be released from the shaft or tightened to it by means of the knob shown.

The bearings for the shafts are made from 3/8-in. by 1-in. flat iron. Each bearing consists of two pieces 2 in. long, clamped flat together and drilled from the side so that it became a two-piece bearing with an oil hole in the top half and with suitable holes for bolting to the frame. A 3/16-in. steel wire clip is used for locking the print to the rollers. A hole is drilled at the front end of the rollers in the discs in line with the seam of the pipe. The wire is bent to fit in this hole, and to lie along the surface of the roller. At the back, the wire is bent to snap down over the end of the roller.

In mounting the print on roller at the right, the lock wire is released from the roller, the print turned under about 3/4 of an inch, inserted under the lock wire and the lock wire snapped into place on the roller. The print can then be rolled onto the right hand roller until the left hand end of the print comes up. The left hand roller is then released from its pulley by backing off the knob at back of roller. This releases the roller and shaft of the left hand roller, and when the wire lock has been released, the print end is turned under and placed over the wire lock, and the wire lock snapped in place on the roller. The roller is then turned to the left to take the slack out of the print while holding the right hand roller, and the knob at the back of the left hand roller is then tightened against its pulley. The print can then be run over the rollers to the right or left by turning the right or left hand front knobs.

The belt between pulleys, shown in Fig. 2, serves two purposes. It takes some of the strain from the print as the rollers are turned, and keeps the print tight by not allowing the rollers to turn independently.

The frame is made from 1/4-in. by 1-in. flat iron, and is mounted on a wood base.

CONSULTING DEPARTMENT

Progressive steps in application of a terminal

Solderless Terminals

To what extent are solderless terminals and connectors suitable for railroad applications?

In Service 13 Years on Swiss Roads

Answers to questions on solderless terminals and connectors which have been published in *Railway Mechanical Engineer* have emphasized the importance of reliability. Repeated references are made to the severe conditions met with in railroad applications.

All your correspondents are in agreement on one point, and that is in the matter of the importance of experience gained in practical application. In Switzerland, such experience goes back to the year 1936, when a new electric switching locomotive of the Swiss Federal Railways was fitted throughout with pressure type connectors of a new design. Since then a very large number of locomotives and cars have been equipped with these connectors, some of which are shown in the illustrations. They are made by Huber & Company, Ltd., Baden, Switzerland, and service results obtained with these terminals agree very well with the experience obtained in America.

From operators of main line and branch line railways, the following chief advantages have been reported:

Small dimensions and weight of the connectors, particularly with large cable sizes.

Small electrical resistance.

Less risk of cable breakage close to the connector (one railroad in particular, the Bern-Loetschberg-Simplon, which operates a large number of heavy locomotives for mountain routes, emphasized this point).

Can you answer the following question? Answers should be addressed: Electrical Editor, Railway Mechanical Engineer, 30 Church Street, New York 7.

On certain of our cars, we have frequent trouble with the mercury tube thermostats; whereas on other cars of an identical design we have practically no trouble with the same kind of thermostats. Can anyone suggest why we have a lot of trouble on some cars, and no trouble on similar cars?

Air-operated tool for applying the terminals

Simple natural insulation protection at the cable end.

Simple tools for pressing on the connector.

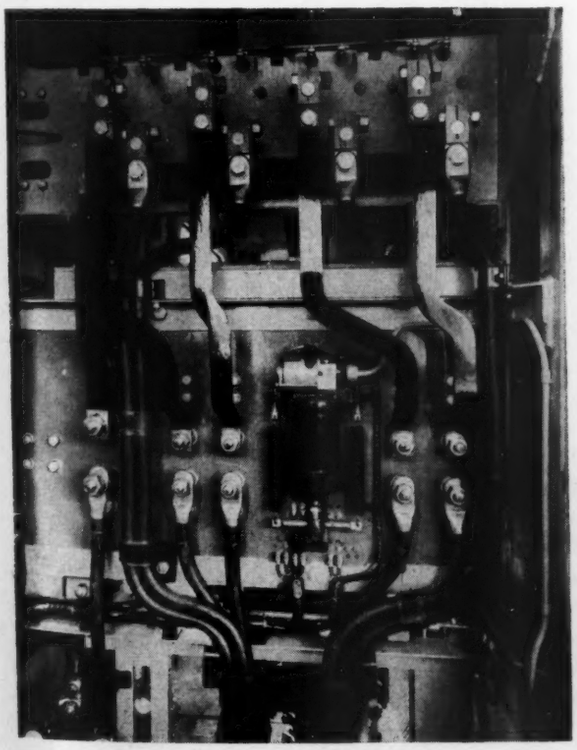
Elimination of solder, flux, insulating material and fuel.

Suitability of the connectors for aluminum cable.

Low cost of material and work.

In only one of the answers to your question were doubts raised as to the suitability of pressure type connectors for general application and that was offered with the reservation that enough experience with them is not yet available. However, experience with pressure type connectors goes back for many years in Switzerland, and such objections to solderless terminals in railroad service may be considered as no longer valid.

J. HUBER
Baden, Switzerland



Back of a Diesel-electric locomotive panel on which pressure type terminals are used

Fluorescent Enginehouse Lighting

(*Continued from page 201*)

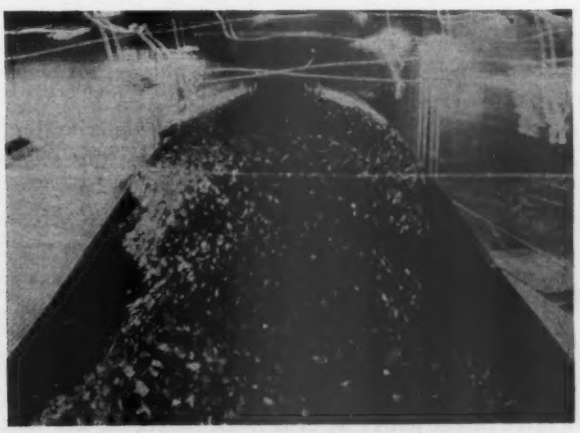
taps for the power circuits, and nine junction boxes are used to bring 440-volt, single-phase connections out to nine single-phase lighting transformers, also mounted on the outside wall. Six of the transformers are rated 10 kva. and three are 15 kva. units.

Three-wire, 120/240-volt secondary lighting circuits from the transformers consist of three, 2/0 cables in 2-in. rigid metal conduit. These circuits supply 9 lighting distribution panels, mounted at a convenient height on the inside of the outer wall. Individual circuits are run from the panels with a switch for each circuit supplying lights. In most cases, there are four fluorescent lighting fixtures on one circuit. All wiring below the messenger wires is in conduit.

Wiring for incandescent lighting including doorway lights and floodlights, consists of two-conductor, non-metallic, No. 10 wire up to points where the circuits pass through the walls. From there they are continued to the lighting fixture in conduit. No. 12 wire is used where the run is less than 50 feet.

There are convenience outlets on each column. These and the pit lights are supplied by two-conductor, non-metallic cable where the circuits are overhead and by rubber-covered wire in conduit where the circuit is below track level.

Sixteen power outlets for portable welders are mounted on columns. These outlets consist of 110-amp., 575-volt, 3-wire, 4-pole, fused outlets supplied with 440-volt, 3-phase power run in 4/0 cable. Machine shop feeders also consist of 4/0 cable. The enginehouse is heated by unit heaters. These are supplied with power for fan operation by circuits consisting of two-conductor, non-metallic cable.



How the coal pile looks under the light

EDITORIALS

Think This One Over

If one has any doubts as to the rapidity with which the Diesel-electric locomotive is replacing the reciprocating steam locomotive in all classes of railway service, it is only necessary to note that, at the end of the war, there were approximately 38,683 steam locomotives and that, at present, the large number of installations of the more modern form of motive power has made such rapid inroads into the ranks of steam power to the extent that there remained, on January 1, 1950, only 28,809 units, a decrease, from 1945 to the present, of 9,875 units. In this same period, 7,091 units of Diesel-electric power have been installed, a ratio of 1.0 Diesel-electric units for every 1.4 steam units.

The replacement of steam by Diesel-electric is reaching the saturation point much more rapidly than almost anyone in the railroad industry would have been willing to predict as short a time as five years ago, and many railroad operators who have been in the forefront of the switch from steam to Diesel are carefully and thoroughly analyzing the economics of the use of motive power with a view to determining whether or not there is a stopping place short of complete Dieselization and, if so, where that stopping place should be in individual cases. Regardless of the enthusiasm with which the Diesel has been accepted as a source of transport power in hauling trains and as a means of effecting substantial economies in railroad operation there appear to be some questions, both practical and with respect to economics, for which there must soon be found logical answers. The answers must also, of necessity, be those which permit of continual adjustment to changing conditions, for this matter of railway motive power has not by any means reached a state where a single answer can be found which may be applied for many years to come. The endeavor to do just that may have been partially responsible for the deterioration of the once strong position occupied by the steam locomotive.

We have been a bit curious to know how railroad managers are thinking about the course which must be pursued for the next five, ten or fifteen years. Prior to the war expressions of opinion on the part of those best qualified to discuss the motive power situation invariably suggested the desirability, in fact the absolute necessity, of the establishment of a motive power policy by American railroads. The fact that there was no policy except in isolated cases led to the rapidity of the demise of steam power for if the solution of the motive power problem had been approached with the same foresight as have many other railroad and industrial problems, no railroad would have found itself in a position of having to Dieselize, or else. The hand of many railroad managements was definitely forced because of a lack of policy. Our investigations incline us to the conclusion that many railroad managements having "found the answer" in the Diesel-electric locomotive are content to predict, with assurance, that all that need to be done is to replace steam with Diesel as rapidly as the money can be found with which to do it. And, having done that, tremendous collateral economies may be effected by the complete elimination of the obsolete facilities with which steam motive power has been inspected, serviced and maintained.

We have asked several railroad officers—mechanical, operating and financial—just how long they thought it would be before the change-over from steam to Diesel would be completed on the roads with which they are connected and the replies have indicated periods all the way from two years on a road, for example with about 600 remaining steam units to ten to twelve years on other roads having anywhere from 200 to 500 remaining steam units. Our own statistical "guess" for the Class I roads was about 12 years or more, at the present rate.

Our next questions had to do with what these roads expected to do with the remaining steam units as a matter of disposition and almost without exception we are informed that the older units will be scrapped and the more modern units will be retained, in storage, to take care of the peak periods in railroad operation which occur one or more times in each year. This naturally gives rise to the question as to steam locomotive repair and servicing facilities. If steam power is to be stored, except for short periods each year, is it going to be stored "serviceable" or in "bad order?" What about the back shops and the engine terminals with coal and ash handling facilities? Are they going to be "stored," too?

It is quite possible, should railroad traffic remain at about present levels, for, say, five or ten years that a carefully worked out policy of motive power replacement could indicate an ownership and utilization position for each individual road wherein a minimum number of Diesel-electric units, in both road and switching service, could handle all the business except the peaks which normally occur each year and the stored steam power could be put in condition,

once or twice a year to step in and help out—then go back into retirement. Sounds simple, doesn't it? Except, that the longer this method of operation goes on the more rapid and complete will be the deterioration of both the stored steam locomotives and the little-used facilities with which, in peak periods, they must be serviced and repaired.

Then, too, we asked several people just how they thought this "policy" might work out in the event of war some ten or twenty years hence and we found the answer to be ridiculously simple. Suppose, for example, that in order to handle the railroad business of the years to come we need about 20 or 25 thousand Diesel-electric units and a reserve of, say, 10 or 15 thousand steam units. Most of the railroads could completely abandon their steam facilities, thereby effecting the economies that logically should be expected as a result of complete Dieselization. A group of strategically located heavy repair shops could handle the job of reconditioning steam power if and when needed—those roads without facilities for making heavy steam repairs could make some kind of a deal with roads having shops to do their work for them.

Then, in event of war being declared this group of regional shops could go to work and put the power in shape for service. Ten modern regional shops, working 24 hours a day could turn out, say, 500 Class 2 repairs a month and in 20 to 30 months all 10 or 15 thousand "reserve" steam units could be rebuilt—assuming of course that the next war could be so arranged that we had that much time.

The only comment we can think of at the moment that seems appropriate to this whole idea is the Irishman's remark that "It's a hell of a spot to be in in a fight."

They Don't Wear Out, They Come Apart

Operation of Diesel-electric freight locomotives for 300,000 miles without an oil change and with no serious operating troubles during this time was described by Ray McBrian, engineer of standards and research, Denver & Rio Grande Western, in a paper presented in February before the New York Railroad Club in New York. Under questioning, he explained how some engine parts, cylinder liners for example, developed fatigue cracks before they showed appreciable wear. He suggested that manufacturers try to develop metal for parts which was less subject to fatigue and led some of his listeners to make the remark, "They don't wear out, they come apart".

Two things are primarily responsible for the phenomenal results obtained on the Denver & Rio Grande Western. Samples of lubricating oil are checked periodically with the aid of a spectroscope, and operating temperatures are maintained near 180 deg. F., care being taken not to let them go below 140 deg. at which values, high rates of wear can be expected. The statement, "They don't wear out, they come apart", is, of course, an exaggeration, but it serves to illustrate a series of operating and maintenance changes which are taking place constantly.

Traction motors of not so many years ago could not possibly take the beating now given to those in general use on Diesel-electric locomotives. In fact, European engineers still insist that motors on high-speed electric locomotives must employ some form of flexible drive which will permit the motor being spring-borne and which will protect it from shock. Under current American practice, Diesel-locomotive traction motors (freight, switching and passenger) are nose-suspended with part of the weight carried on an axle bearing and part by a spring support to the truck frame.

The size of these motors is sharply limited by space restrictions but improvements in design have permitted a constant increase in horsepower rating. In early designs, motor armature bearings were a source of considerable difficulty. Greatly improved lubrication and better bearing designs have practically eliminated bearing failures. Class B and Class H insulation have permitted the use of more copper in coil slots of a given size and have allowed higher operating temperatures. This in turn has passed the ball to the connections between commutator risers and coil ends. To meet this, high-temperature solders and better methods of soldering have been developed. In this issue is described a method of making these connections without solder. Should the procedure prove to be practicable, it will permit other improvements.

The net result of these developments is increased capacity, reduced failures, longer life and increased mileage between overhauls. From the mourner's bench we still hear cries of, "Just wait until these locomotives get old and see where their maintenance costs will go", but with many betterments in service and in prospect it seems entirely probable that the mourners may have to forego their morbid pleasure.

Be Sure to Get All of the Savings

The mechanical officer who has difficulty in obtaining the money necessary for a new machine for one of his shops often finds that the reason for his difficulty is that he is unable to show directly

a high return on the investment. Quite often the return that can be shown is reasonable enough when considered by itself, but the appropriation is denied because top management considers that higher returns can be realized by expenditures in other places. This is a natural reaction as, with a limited amount of money to be spent, investments will be restricted to those expenditures that show the highest rate of return. Thus, even though the return on a new item of machinery may be as high as 15 per cent, the money is not forthcoming because some other department was able to show a higher percentage return on an investment desired by the other department.

The answer to this perennial problem may lie in the failure of the mechanical department to take into account *all* of the savings attained by the new machine. Consider the case of an investigation into the feasibility of purchasing a new lathe, which, for sake of keeping the arithmetic of the example simple, costs $10,000. The savings to be made in the shop in which the new lathe is installed may amount to $1,500 per year, or a return of 15 per cent on the investment. Perhaps this is not considered to be a sufficiently high return to justify the purchase, and as a result the decision is made against buying the machine.

Carrying the analysis only this far can be a mistake because the total saving that could be made might be considerably more than the $1,500 that would be saved in the main shop. When the old machine in the main shop is transferred to a secondary shop or a roundhouse, a further saving of $500 or $1,000 may be realized through the replacement of a still older lathe by the one that was transferred. Thus the overall saving may be $2,000 or $2,500 per year, a return of 20 or 25 per cent on the investment instead of the 15 per cent that was originally shown when only the immediate benefit with respect to the use of the machine in the main shop was considered.

The individual shop superintendent who makes a request for a new machine is in a position to estimate what he can save in his shop by replacing a given machine by a new one. He is not in a position to judge what can be saved by some other shop remote from his if the outlying shop is given his old machine to replace a still more obsolete machine at the outlying point. Initial requests are quite likely, therefore, to omit showing part of the savings that can be made by a new machine. It is up to those officers in the mechanical department who have broad and general charge of policy to instigate joint consideration among the two shops involved and to sum up the individual savings from both shops. By thus considering the *total* savings that can be made, then, and only then, can the proper decision be reached on the purchase of new machinery. Very likely a good deal more new and modern machinery will be found economically justified than is currently being purchased and installed if all factors are taken into consideration.

NEW BOOKS

PATENT PRACTICE AND MANAGEMENT. *By Robert Calvert, Ph.D., patent attorney. Published by the Scarsdale Press, Box 536, Scarsdale, N. Y. 371 pages, cloth bound. Price $5.*

The primary subjects discussed in this book for inventors and executives, as mentioned in its preface, are how to obtain patents, how to use them and how to administer the patent policy in such manner as to stimulate research and invention, improve morale of an organization, and serve the interests of the sponsor who makes the inventions possible in the first place. The patent law, itself, is given in some detail as an aid in forming judgment in patent matters. It is presented in simple words, illustrated by representative examples from American industrial history, with occasional use of language from decisions of outstanding jurists.

WELDING HANDBOOK. *Published by American Welding Society, 33 West 39th st., New York 18. 1,650 pages; Price $12 in United States & Canada, $15 elsewhere.*

The third edition of the Welding Handbook has just been published by the American Welding Society. The book contains 65 chapters covering the more than 30 welding and cutting processes in use by industry today, the welding of ferrous and nonferrous metals and alloys, and the application of welding in different industries. Also included are individual chapters on cost estimating, welding metallurgy, physics of welding, a dictionary of welding terms, general engineering tables, welding symbols, filler metal specifications, inspection, and many others. A bibliography at the end of each chapter lists the important codes, standards, books and technical articles on the subject for those seeking further information.

More than 300 tables are included in the handbook to make it useful for ready reference and illustrations are generously used to show welding equipment, welding details and specific applications. The 69-page index makes it possible to readily find specific information and related information contained in different chapters. Both the index and the text are extensively cross-referenced. Items in the index have been grouped by welding processes, by metals, by applications and have been further grouped under engineering headings such as design, workmanship, inspection, etc. Each item is also separately listed in alphabetical order.

CAR INSPECTION AND REPAIR

Changes in 1950 Interchange Rules*

By T. J. Boring†

You have probably wondered why so many changes are made, and so often, in the Interchange Rules. That is due to continual improvement and changes in car parts, car construction, car service interchange problems, methods of repairs, billing practices, etc., and the ever fluctuating costs of labor and materials.

The prices are revised by the A. A. R. Committee on Prices for Labor and Materials by checking in Spring and Fall through quotations obtained from the purchasing agents of ten railroads representative of all sections of the country, including one Canadian road. To the average material costs are added seven per cent stores expense, one per cent interest on stock investment and approximately one per cent for commercial and deadhead freight haul; see Interpretation No. 1 to Rule 105. Labor rates are similarly checked, and to these averages are added percentages to cover overhead expenses, railroad retirement and unemployment insurance taxes and vacations with pay, as described in the preface to Rule 107. All price revisions, including reproduction prices for destroyed cars, are also subject to approval by the Arbitration Committee. The private car lines are adequately represented on these committees.

Car repair billing is an important and necessary part of this general subject and if you have no idea as to what this totals for the country, I might state that the last survey by the A. A. R. for the year 1939, indicated a total for freight car repairs, billed by railroads, of $30,853,696 excluding repairs to passenger equipment cars, repairs on defect cards, "No. Bill" repairs, destroyed cars, and billing by private car lines. Of that total, $9,761,664, or 31.6 per cent, was for repairs to private car lines.

Just to show how the roads represented in this Association treat our Pennsylvania freight cars, and vice versa, regarding repairs charged, the data in Table I is presented.

Rule Changes

In taking up the changes made in the Interchange Rules effective January 1, 1950, I will not discuss those issued in Supplement No. 1 dated April, 1949, and Supplement No. 2 dated July, 1949. Since important changes have been made they should be carefully studied and the requirements strictly followed. In addition to the changes from 1949 Rules printed in front of the Interchange Rule book, attention is directed particularly to the following:

Rule 3

The effective dates of the following sections have been extended to January 1, 1951:

Sec. (a-4)—Type AB brakes required on all cars, in interchange.

* Abstract of a discussion of the changes in Interchange Rules presented before a meeting of the Eastern Car Foremen's Association, New York, Feb. 10, 1950.

† General foreman, M. C. B. Clearing House, Pennsylvania.

TABLE I—CAR REPAIRS, SELECTED ROADS, YEAR 1949

Road	Repairs to P.R.R. freight cars: Total repairs	Per diem days	Repairs per car day	Repairs made by P.R.R.: Total repairs	Per diem days	Repairs per car day	Foreign roads exceeded repairs made by P.R.R.
B. & O.	$287,774	972,744	$0.295	$119,052	1,322,342	$0.090	$168,722
B. & M.	73,748	271,571	0.311	13,815	145,658	0.094	60,333
C. N. J.	27,497	214,497	0.122	12,059	82,993	0.145	15,438
C. R. P.	48,476	64,946	0.746	13,983	217,321	0.064	34,493
D. & H.	185,035	293,348	0.630	36,329	374,643	0.097	148,706
D. L. & W.	180,019	418,243	0.435	43,744	570,051	0.076	136,275
Erie	133,961	485,344	0.277	51,379	576,096	0.089	82,582
L. V.	97,913	500,486	0.195	38,788	435,720	0.089	59,125
N. Y. C.	542,760	2,724,448	0.202	232,167	3,185,950	0.073	310,593
N. H.	141,731	525,628	0.269	16,924	303,065	0.056	124,807
Reading	186,684	618,791	0.301	56,954	730,198	0.078	129,730
Total	$1,905,598	7,090,246	0.268	$635,194	7,944,037	0.079	$1,270,804 or 0.189 per car day
Total Defect Cards	$99,737			94,238			
Grand total	$2,005,335			729,432			

Sec. (a-6)—Air brake pipe clamps; *J* bolt type.

Sec. (a-7)—Air brake pipe clamps; *U* bolt type.

Sec. (b-7)—Metal badge plates (brake levers).

Sec. (b-9)—Required brake power percentages.

Sec. (c-11)—Old style couplers having 5-in. by 7-in. shank.

Sec. (c-12)—Type *E* couplers, bottom rotary operated, not equipped with assembled riveted type lock lift lever and toggle.

Sec. (t-3-f)—Cast-steel truck sides to which repair patches or reinforcing plates have been applied.

Sec. (u-4)—Non-acceptance of Class E-3 cars from owners.

Sec. (a-4)—New second note: added quoting Order issued October 10, 1949, by the Interstate Commerce Commission, providing that: (1) Where the number of cars of any ownership not equipped with AB brakes is 2,000 or less, all shall be equipped or withdrawn from interchange freight service on or before December 31, 1950; (2) Where the number of cars of any ownership not equipped with AB brakes is over 2,000, one-half shall be equipped or withdrawn from interchange freight service on or before December 31, 1950, and the remainder on or before December 31, 1951.

The particular wording of this order seems to present difficulty when it comes time to write an enforceable rule for next year.

Sec. (b)—Modified as follows on account of the adoption of new A. A. R. Standard No. 18 brake beams effective March 1, 1950:

Par. (1)—Changed to (1-a) and shows present A. A. R. Standard No. 15 brake beam as *former* A. A. R. Standard and limits its application to new and rebuilt cars to January 1, 1951, in interchange.

New Par. (1-b)—Added to provide that brake beams of not less than the capacity of the A. A. R. Standard No. 18 required on all cars built new or rebuilt on or after January 1, 1951, in interchange. Nos. 3 and 18 beams have the same capacity (18,000 lb.), but this rule intends that No. 18 or stronger beams must be used.

New first note—Added providing that *new* brake beams applied in repairs to any car on or after January 1, 1951, must be of not less than the capacity of the A. A. R. Standard No. 18 beams. This intends that new beams purchased must be No. 18, however, it does not prohibit repairs to and application of Nos. 2-Plus, 15 and 3 beams in repairs under certain conditions.

New second note—Added to show that the No. 15 brake beam remains the A. A. R. Standard until March 1, 1950 when it will be superseded by the A. A. R. Standard No. 18 beams.

The Report of the Subcommittee on Brake Beams in last year's Report of the Committee on Car Construction (A. A. R. Circular No. D. V. 1198), shows that, as a result of laboratory tests made by the A. A. R., official certificates of approval would be issued covering five A. A. R. Standard Brake Beams. These have been approved by letter ballot. The new specifications require that A. A. R.-18 followed by the certificate number shall be marked on the strut. A brief description of these beams is shown in Table II.

TABLE II—DESCRIPTION OF APPROVED BEAMS

Certificate, No.	Type	Tension member	Heads
102	Positive	11/16 in. by 2-in. strap	Removable, 1 rivet
*106	Forged	1 5/16 in. dia. rod	Removable, 2 rivets
501	Unit	13/16 in. by 1 1/4 in.	Not removable, welded
503	Unit	One piece integral cast steel	Not removable
*504	Unit forged	1 3/16 in. dia. rod	Removable, 3 rivets

* Nos. 106 and 504 are duplicates except that No. 106 is the hanger type, and No. 504 is the unit type, each having the same kind of compression and tension members, forged integrally. No. 102 (positive) is also hanger type.

None of the No. 18 beams use tension rods with threaded ends.

Par. (b-2)—Modified to provide that effective January 1, 1951, the minimum capacity of brake beams permitted on any car in interchange will be No. 2-plus beams instead of No. 2 beams. See Item 2 of Rule 19, which is modified to prohibit the application of brake beams of capacity less than the No. 2-plus in repairs to foreign cars.

Sec. (d-1)—New third note added providing that short draft gears for cars of special construction for ore service must be submitted to and approved by the Committee on Couplers and Draft Gears before such cars are permitted in interchange service.

Sec. (r-7)—Modified to clarify the intent in regard to application of metal running boards to tank cars.

Pullman-Standard Car Manufacturing Company, Type AH-4-S, added to list of approved steel running boards—Group No. 1.

Sec. (w-3)—Wheels, 700 and 750-lb., single plate, non-bracketed, cast-iron, cast prior to 1938, are now prohibited in interchange.

Rule 4

Sec. (f-4)—Modified to clarify the intent as to carding for cut metal posts, stakes, braces or their substitutes on open-top cars.

Rule 9

Requirements for journal boxes, friction bearings, periodic repacking, etc., and journal roller bearing units periodic lubrication, etc.—Modified to make it optional as to whether separate billing repair card shall be used to record this work. Also to provide that charges will be shown in a new price column on the Billing Repair card titled, "Periodical Repacking," which takes the place of present malleable iron column which will be discontinued and shown in the net price column. This change is for the purpose of reducing the work of preparing separate repair cards, however, the same data must be shown as heretofore as to old markings, purpose for which car was shopped, etc.

Draft Gear Keys—Added to require that thickness, width and length of keys must be shown on billing repair cards for figuring correct weights for charging. The length shown should be from under the head to the center of retainer pin hole. (See table of Horizontal Draft Gear Keys on page 216 under Rule 101.) *Interpretation No. 2* is also modified to require that dimensions of draft gear keys must be shown on billing repair cards.

Rule 16

Third Paragraph—Modified to provide that where tanks of tank cars are equipped with rubber linings, tank must be stenciled as described to afford owner protection for first application under Note No. 2 of Rule 112-B-8, in case car is later badly damaged or destroyed, or rubber lining is damaged in connection with steaming, cleaning or entering tank for inspection or repairs. Rubber linings are very expensive, costing over $3,000 per car.

When shops report for disposition any such tank cars badly damaged or destroyed under Rule 112, report must show whether car is stenciled for rubber lining and date applied in accordance with this paragraph.

Rule 18

New Paragraph (g)—Added to encourage the application of A. A. R. Alternate Standard, or approved equivalent, coupler draft key retainers in place of non-approved retainers (whether or not defective) at car owners expense, when cars are on repair tracks for any purpose. Former A. A. R. Standard Type T retainers must not be removed unless defective, but should have an approved lock applied, at car owners expense, thus converting it to an A. R. R. Alternate Standard.

New Note—Added stating that a list of all A. A. R. Alternate Standard Draft Key Retainers, and A. A. R. Approved Equivalent Retainers, and Locks are shown under Rule 101, page 216.

[All P. R. R. cars having either 1½-in. by 6-in. or 1⅛-in. by 5-in. coupler horizontal draft keys have same equipped with the former A. A. R. Standard T type retainers (1½-in. diameter). This T retainer is also used very extensively on cars of other ownerships as it had been the only A. A. R. Standard for many years. We, therefore, have adopted the separate positive lock for application to these Type T retainers, which converts same to A. A. R. Alternate Standard, there now not being any A. A. R. Standard. Repairs to our cars must be made in this manner.]

Rule 19

Item 2—Modified to prohibit the application of brake beams of less than the capacity of the No. 2-plus beam to foreign cars.

Item 19—Pipe unions in hand rails of tank cars are prohibited repairs—This item was first added effective January 1, 1945 and instructions were issued at that time that repairs to tank car hand rails must be made by application of right and left hand pipe couplings as the use of pipe unions in such is a violation of I. C. C. Safety Appliance requirements. Additional complaints have recently been received by the A. A. R. from some tank car owners stating that pipe unions applied by railroads and "no billing" owners stating that pipe unions applied by railroads and "no billing" repair cards rendered, thus making detection of such offenders impossible. Proper pipe couplings should be stocked and applied in repairs.

A recent inspection of 106 tank cars of one private line ownership (C O S X O S K X) in the Southwest by the chief mechanical inspector of the A. A. R. Mechanical Division (Report of May 10, 1949) developed that 84 cars had from one to four unions in the hand rails and in one case, the hand rail had been welded, which is also a violation.

Rule 23-B

New Item-Wedges, Journal Bearing—Added to provide for reclamation by fusion welding, and finishing to dimensions new.

Rule 32

Sec. (10-k) Note—Modified to provide that: "center sills warped, sagged, *buckled* or bent in excess of 2 inches, *vertically or horizontally, within a space of 6 ft. between inside edge of bolsters,* where there is evidence of direct flame having been applied thereto", is handling line responsibility. The underscored portion is new. Formerly this limit of warp, sag or bend was 2½ in. without specifying method of measuring same.

New Sec. (12)—Added as follows:

(12) (a) Contamination—Box or auto cars classed as suitable for grain loading or better, or refrigerator cars, must not be loaded with any of the contaminating commodities listed below. If so loaded and it becomes necessary to renew floors, lining, or sheathing (including associated parts), or portions thereto, in order to restore car to previous loading classification because of contamination due to such loading, the cost of the repairs shall be assumed by the road (either switching or roadhaul) responsible for furnishing the car for such loading. (This applied to cars so loaded on and after January 1, 1950.)

1. Animal products:

(a) Hides, pelts or skins (green, green salted, or salted); (b) Glue stock; (c) Manure, or fertilizing compounds with contaminating odor; (d) Meat scraps, offal, tankage, or waste from slaughtered animals.

2. Copra
3. Fish scraps or fish meal
4. Shells (clams, mussel, or raw oyster) in raw state with contaminating odor. (see Car Service Rule 18)

(12)(b)—When contamination damage as outlined above is discovered when car is being unloaded, or immediately thereafter the road having car in its possession should attach its defect card if responsible. If not responsible, it should attach Information Card (as information only) showing the facts and data from the waybill as to place, date and road on which car was loaded and kind of lading. Car owner must submit joint inspection certificate with request for defect card to road responsible, and give such road opportunity to inspect the car, as outlined in Interpretation No. 3 under Rule 4 covering cars damaged by flood or fire. Contamination damage is not cardable in interchange.

The requirements of this new Section should be carefully followed and the selection of cars for such

contamination commodities supervised to see that no good cars are offered for or so loaded on any line. Any car found contaminated at unloading station or immediately thereafter, should be handled as specified above, shopped and reported to the proper authority. The same applies to any car found with foreign line Defect Cards or Information Cards attached showing same damage due to contamination. Reports should include waybill data as to place, date and road on which car was loaded and kind of lading. Joint Inspection Certificates in duplicate should accompany these reports.

Rule 43

Modified to exclude from owners defects, "inside contamination damage" to correspond with new Sec. (12) of Rule 32.

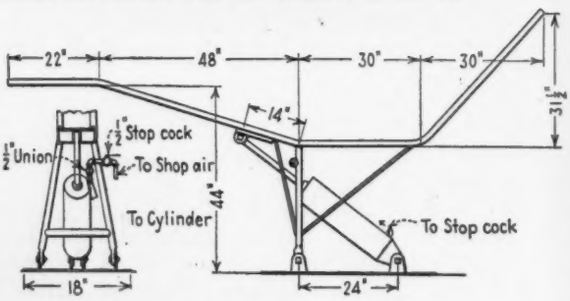
(*To be continued*)

Air Brake Parts Lifter

The application of AB cylinders, AB valves and the auxiliary reservoir to hopper cars is made easier and safer by means of a pneumatic elevator and sliding transfer equipment. The arrangement was constructed by car shop forces of the Illinois Central at

The elevator in loading position

When the end is raised by the air cylinder, the reservoir, or other part being applied, slides along the tubular rails for transfer to the car



Construction details of the elevator for applying AB equipment to hopper cars

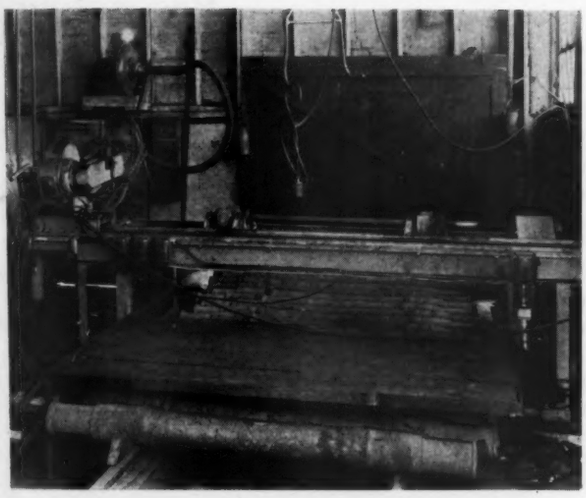
Centralia, Ill. The air brake part to be applied is placed on a pair of tubular rails at the end of the lifter furthest from the car. When the air is turned on, this end of the lifter is raised sufficiently to cause the part to slide to the approximate center of the lifting device. The tubular rails at the other end of the lifter were placed in a horizontal position by the application of the air, and are now used to slide the part as far as the edge of the car. The part is transferred the remaining distance to its point of application without having to be lifted, by means of a concave-shaped board 1¼ in. by 12 in. by 50 in., the top of which is covered with sheet metal. The board rests across the end structural members of the hopper car.

The elevator is constructed of suitable lengths and shapes of 1-in. extra heavy piping welded together. The power is supplied by a single-acting cylinder 6 in. by 24 in. acting through a linkage constructed of 1¼-in. pipe. This power assemblage is bolted to sections of ¼-in. plate to form the base on which the elevator is moved to align it properly with the car to which the brake equipment is to be applied. The union in the air line is fitted with a $\frac{3}{64}$-in. choke to throttle the air for the proper rate of lift.

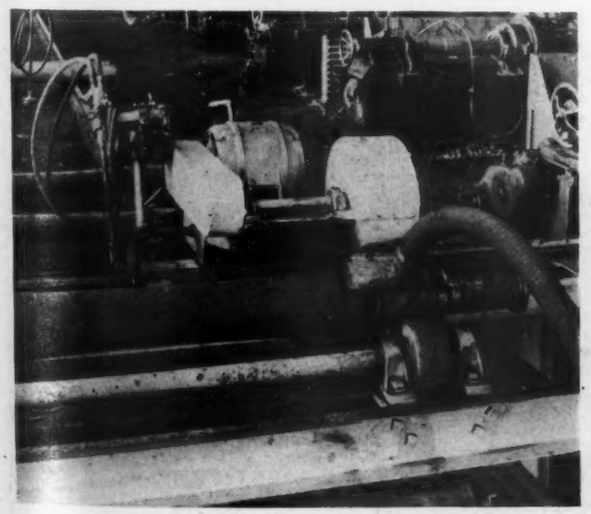
The stop cock has a ⅛-in. hole drilled through to bleed off the cylinder air when in a closed position. This permits the elevator to return by gravity to loading position when the air brake part is transferred to the car.

Cleaning Axles By Flame and Wire Brush

Despatch Shops, Inc., East Rochester, New York, has developed a procedure for cleaning axles prior to Magnaflux inspection which can be completed by one man in about ten minutes. The cleaning is done by a combination of an oxy-acetylene flame and a steel wire brush. Cleaning an axle requires an average consumption of about 6.12 cu. ft. of acetylene and the same amount of oxygen. The brush cost amounts to about 2 cents per axle.



Arrangement for cleaning axles by flame and wire brush — The dolly-mounted wire brush and heating torch are shown in the left foreground, the suction blower in the left background and the rollers on which the axle is mounted in the center



Close-up of the heating torch, the wire brush and the suction blower inlet of the arrangement for cleaning axles prior to Magnaflux inspection

The axle is lowered onto the cleaning arrangement with a conventional axle sling, each wheel seat resting on a pair of rollers. One of the rollers in each pair is connected to the equivalent roller in the other pair through a common shaft. One set of the rollers on the common shaft is motor driven during the cleaning operation at a speed of 33 r.p.m.

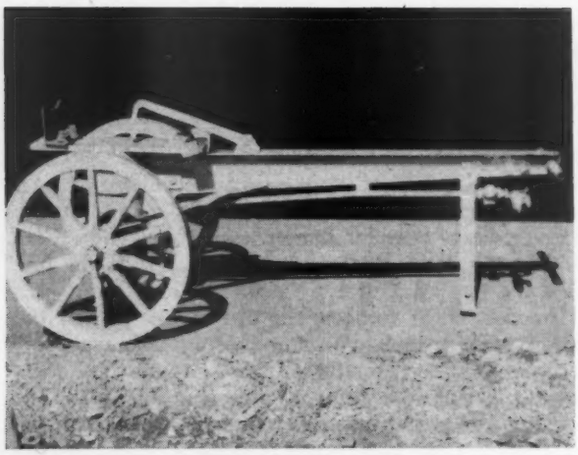
As the axle is revolved the dirt is loosened by the heat from a seven-flame water-cooled hardening head, which was chosen for the purpose because it concentrates the heat and reduces the gas consumption. The flame is followed by a steel wire brush at an interval of about 16 in. This brush is actually 3 brushes set side by side to form a continuous cleaning surface about 6 in. wide. The brush has a diameter of 12 in., is driven at a speed of 1,200 r.p.m., and lasts for about 2,000 axles.

The feed of the machine is by hand for maximum flexibility in handling differences in accumulated caked-on foreign matter, grease and dirt. The wire brush is mounted on the end of a pivoted arm and rests upon the axles by its own weight. By applying the brush pressure in this manner the axle contour is automatically compensated for. The heating torch has a separate adjustment for movement in and out so that an approximately constant distance can be maintained between the heating head and the axle despite the changing contour of the axle. The dolly on which the torch and wire brush are carried is mounted on a 4-wheel truck. The wheels are grooved in the center and ride on an angle mounted on an I-beam.

Dirt dislodged by the wire brush during the cleaning operation is removed by a suction blower driven by a 3-hp. motor. The inlet for the blower is attached to a shield which covers the wire brush and extends about 2 in. beyond the brush on each side. The dirt is exhausted out the shop through a rubber hose to the atmosphere.

Draft Gear Application

Removing and applying draft gears is made easier and safer at the South Louisville, Ky., shops of the Louisville & Nashville through the use of a lifting cart constructed by the shops' forces. The cart is wheeled next to a standing draft gear, the handle moved to a near vertical position, and a small protruding ¼-in. retaining plate slipped under the bottom of the gear. When the handle is lowered, the draft gear rides in a horizontal position on the cart for movement to the car. It is secured in place by a hook on the handle which drops into holding position over the gear. When the draft gear is at the car location it is raised into place by a 6-in. air cylinder mounted between the wheels and held until secured with the tie strap.



Cart which simplifies the application or removal of draft gears

The cart has two 25-in. wheels 23 in. apart. Piping from the air cylinder runs to the end of the 6-ft. handle where a control valve is located and where the air connection is made to the shop air lines.

The draft gear rests on a plate ¾ in. by 7 in. by 24 in. The protruding and retaining plate is ¼ in. by 3 in. by 5 in. set perpendicular to the plate on which the gear rests. The hook which holds the draft gear in place is 18 in. behind the center line of the air cylinder and is ⅜ in. by 1½ in. by 15½ in. long. The main frame is built up with two angles ¼ in. by 1½ in. by 1½ in. welded to a length of ¼-in. plate, which is 3 in. high at the handle end and increases to 6 in. at the wheel end. The handle for guiding the cart is of 1½-in. pipe and is 16 in. long.

Automatic Heating For Bending Beams

Heavy beams used for bolsters in hopper cars get 30-degree bends in eight minutes by the use of the equipment shown in the accompanying photograph. Oxyacetylene blowpipes heat an area on both sides along the bottom of the web of the beam. The blowpipes are mounted on Oxweld portable cutting machines which start the heating operation at opposite ends of the beam to get uniform heating. Tow blowpipes are used on each side of the beam so that the previously heated area stays in the red heat range. Heating takes about six minutes. At the end of the short heating period the beam is moved on rollers to the bending position where the bottom flange is clamped and four pneumatic rams operate a device that make the required bends.

Automatic oxy-acetylene heating has many other uses in railroad shop work. Equipment is flexible, simple to use, and is equally well suited for many bending and forming operations.

Preventing Side Sheet Rust

One road has practically eliminated serious rust damage on the lower part of steel box car and automobile car side sheets by cleaning the inside of the side sheets at the floor level with a scraper and wire brush, after which all dirt, rust and loose scale is blown out with air. A flat nozzle is used so that all corners and openings between floor ends and side sheets will be reached.

This surface is then given a brush coat of rust preventative paint to a point approximately 18 in. above floor level. After this coat is thoroughly dry, a coat of car cement is applied.

Cars are prepared for cleaning and painting by the removal of bottom lining boards and grain strips in order to clear the interior of the side sheets to the floor level.

After cleaning and painting is completed, new grain strips are applied. When the lining is reapplied, a clearance of 1¾ in. is left between the lining and the floor to permit the grain to run out and make future cleaning easier. Previously, lining was applied to the floor level and grain would collect behind the lining at the floor, get damp, mold and thereby rust and corrode the sheets.

This automatic heating setup was used to process 3,000 beams — The heating station is at the left; the bending station at the right

SHOPS AND TERMINALS

Automatic Heating For Small Buildings

One of the effects of the five-day week on the Monon was the necessity of providing engine watchmen at nights and over the week-end at Bedford, Ind., where two Diesel switchers are assigned, one on a five-day basis and the other on a six-day job. The road eliminated much of the expense by constructing a small one-track building for storing the two Diesel units and installing automatic heating equipment.

The automatic heating plant consists of a common gun-type oil burner which fires an American Radiator Company's low-pressure type steam boiler which supplies steam to a large unit heater. The unit heater fan motor is controlled by an aquastat in a steam line near the boiler and the oil burner is controlled by a thermostat operating on air temperature in the building.

The heating boiler and controls and its location in a Diesel locomotive storage house.

Springs Hung by High Lift Truck

A complete set of springs is applied to an eight-coupled locomotive at the Wabash, Decatur, Ill., shops

Attachment for the lift truck table which permits the application of locomotive springs even at such difficult areas as that behind the link trunnion

Applying a locomotive driving spring with a fork lift truck

in 10 to 15 minutes with maximum safety by means of a device applied to a 72-in. lift truck. This device slips in two holes near the center of the lifting table and rests on the forward end of the table. It is offset to go under the link trunnion and so constructed that the attachment can slip under and raise one spring at a time and deposit it in place on the locomotive.

A wheeled rack is used in conjunction with this method of applying springs and holds an entire set of eight. When the springs are removed from a locomotive they are loaded on this rack and sent to the spring shop for repair. After repairs have been completed the springs are again loaded on the rack and sent to the erecting shop for storage. When needed, they are lifted one at a time from the rack by the truck and applied directly in their proper location on the locomotive.

The device which slips under the springs is composed of two sections of bar stock 1¾ in. square with the nearest sides set 15 in. apart. A bar of the same size also extends from one side to the other at the point of the offset. Two feet made by a small offset on the end opposite that which holds the spring rest in two holes on the truck table. The front end rests flat on the cross bar welded to the bottoms of the two offset bars.

The lifting device is of all-welded construction and 29 in. long from the front end to the point of the offset. The bar stock is then bent vertically for a distance of 7 in. after which it is bent again to extend outward another 12 in. parallel to the 29 in. dimension. The spring rests on and is held from dropping off by two cleats 1 in. by 1 in. by 1¾ in. set 8¾ in. apart on each of the 12-in. outer sections.

Side Platform For Diesel Repairs

One means by which the E. J. & E. has adapted its former longitudinal steam locomotive back shop at Joliet, Ill., to efficient Diesel repair work is by the use of an adjustable-height side platform which, when not in use, can be quickly dismantled. The platform is sturdy enough to support workmen, miscellaneous tools, engine parts and a steel work bench.

The platform is used on one side of the locomotive only. The inside edge is bolted to the side of the locomotive underframe, and the outside edge rests on five evenly-spaced scrap 4-in. flues, 6 ft. high. Each of the uprights has a series of eight holes 2½ in. apart for inserting a ½-in. bolt which, through a box section of ¼-in. plate and angles, supports the platform.

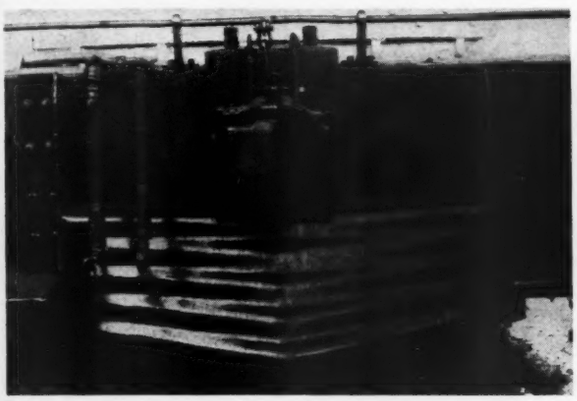
An angle ⅜ in. by 6 in. by 6 in. is bolted to a box section on the tops of each of the five posts. The ¼-in. steel floor of the platform is flanged upward on the outer edge and is bolted to the bottom and to the side of this angle. An angle ¼ in. by 2 in. by 2 in. is bolted underneath along the two ends of the platform. At the platform edge nearest the locomotive there is a 3-in. by 15-in. angle 1-in. thick and the platform is bolted, in two locations, to existing holes in the locomotive side frame by means of holes in this angle. The platform is reinforced lengthwise along the bottom center line by an angle ¼ in. by 1½ in. by 2½ in. which runs the entire length of the platform to within two feet of each end. Two sections of ¼-in. plate bent to an angle are welded along the reinforcing angle at intervals to support a ¾-in. round truss bar which is threaded at each end.

The side platform is supported by five posts along the outside edge and by bolting through angles to the side of the locomotive underframe on the inside

One-Piece Pilot

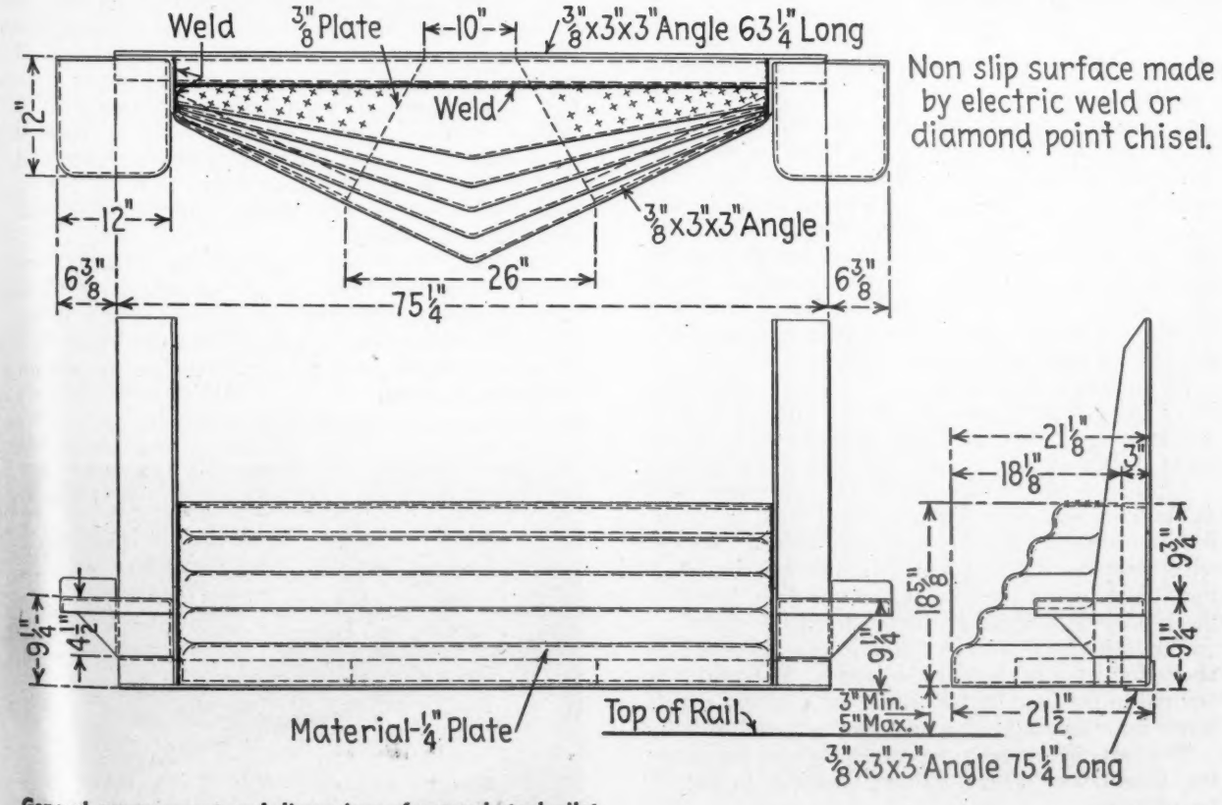
The locomotive pilot, illustrated, was made and applied at the Bay Shore, Calif., shops of the Southern Pacific and is now quite widely used on this railroad because of its simplicity, durability and relatively low cost of manufacture and maintenance.

The principal feature of the pilot is a one-piece pressed steel nose, formed as shown in the illustrations. This nose is made of a single piece of ¼-in. steel, pressed hot in one operation under a Morgan 300-ton hydraulic press. The bottom half of the die is the female section and the top half, attached to the press ram, the male.



One-piece steel pilot nose as pressed

The pilot frame, top, sides and stiffened bottom tie, are made of 3-in. angles, suitably welded to the one-piece nose and designed for easy bolting to the pilot beam, as shown. A 12-in. square, flanged, pressed foot plate is applied at either side of the pilot. Both foot plates and the upper horizontal ledge of the one-piece nose are given non-slip surfaces by pressing, electric welding or with a diamond-point chisel.



General arrangement and dimensions of pressed steel pilot

Piston Ring Tool

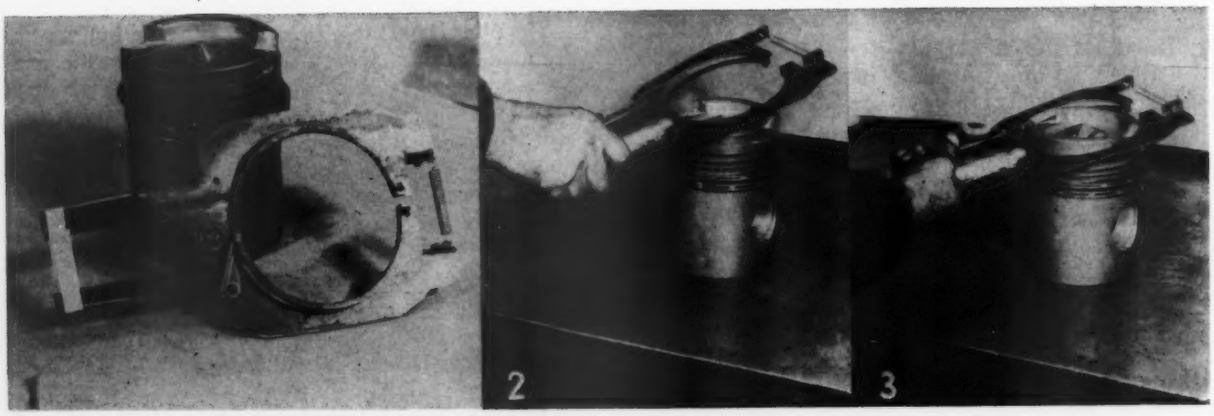
By W. E. Abbott

Recently we had two Cummins Diesel engines which needed pistons and cylinder liners renewed. New pistons were delivered without the rings in place so that they had to be applied locally. An attempt was made to purchase a tool for applying piston rings from local automotive supply houses but they did not stock the size required for the Cummins engine.

As we had a total of 60 rings to apply to new pistons, it was considered worth while to make a tool which would serve for this job and in the future.

The three pictures show the general details of construction of the tool. It is made from ⅛-in. sheet iron.

In illustration No. 1, the tool with a ring partly expanded is shown. In No. 2, the tool with ring expanded is ready to slide down over piston and in



Special shop made tool for applying piston rings

No. 3, the tool with a ring about in position over the groove in the piston where the ring is to be placed is shown. When the ring is over the proper groove, the tool is released and this releases the ring. The tool is then expanded and lifted off the piston when the ring is free of it.

The tool can also be used to remove rings from pistons when the rings are new, old rings would be worn and not worth saving.

Stencil Holder For Metal Signs

By W. E. Abbott

The idea of providing a safety sign, for men in enginehouses, was recently put into effect on an Eastern road. These signs, which are 5 in. by 9 in., are used by all men who have work to do on a locomotive. The sign is hung on the throttle in the locomotive cab and indicates that work is being done on that locomotive and that it is not to be moved, nor is any valve or device to be opened or closed until it is determined that so doing will not endanger the workman whose name appears on the sign.

To lay out a line on about 125 signs, measure the letter spacing for names of 4 to 15 letters and keep the letters straight, presented quite a task, much more than stamping a part with but a few letters.

A piece of 1-in. by 4-in. by 25-in. flat iron is used as the base, two pieces of ¼-in. by 1½-in. by 22-in. flat iron are spaced ½-in. apart and joined together with two pieces of ⅜-in. by 1-in. flat iron by welding. These ⅜-in. by 1-in. pieces are 9 in. apart at the inside edges which is the length of the signs.

The ¼-in. by 1½-in. by 22-in. pieces assembled as above form the holder for the letters. The holder is secured to the base by two ½-in. wing screws which screw into threaded holes, one near each end of base.

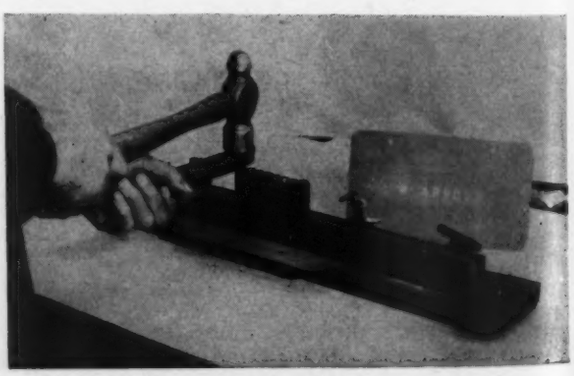
The holes in the signs, for attaching wire for hanging, were drilled with a uniform spacing, in lots of ten or more.

In inserting the sign under the stencil holder, the ½-in. wing screws are released sufficiently to allow the sign to be inserted under the holder, the holder is then moved right or left until the ⅜-in. by 1-in. pieces welded across top of holder are in line with ends of sign after which the ½-in. wing screws are tightened down. This holds the sign rigid against the base and will not allow it to be pulled out of shape when the stamping is done.

A center line is marked on the holder, the two ⅜-in. by 1-in. cross pieces are threaded for a ⅜-in. wing screw, two ½-in. by 1½-in. by 5-in. flat iron pieces are used from right and left ends inside holder to hold stamps. They can be held where wanted by means of the ⅜-in. wing screws after the stamps have been set up in the holder for a name.

In setting up a name, the difficulty of having the letter right side up was overcome by painting one side of all stamps with red paint. One initial is used with the last name. The initial letter is put in position and the space between initial and name is filled with an inverted stamp. Where a letter is repeated or doubled in a name, inverted stamps are used and with a little practice one soon learns to move the repeated letter to the new position in the holder for completing the name.

After the signs are stamped, the corners are rounded and any rough edges smoothed off. The signs are then painted blue and allowed to dry. When dry, thick white paint is rubbed into the letters and the surface wiped clean, the resulting signs are shown in the two pictures.



QUESTIONS AND ANSWERS

The question and answer department is included for the benefit of those who may desire assistance on problems involving matters pertaining to the operation or maintenance of air brakes, Diesel-electric locomotives, steam locomotive boilers or steam locomotive practice. Any inquiry should bear the name and address of the writer, whose identity will not be disclosed unless special permission is given to do so. Anonymous communications will not be considered. Inquiries addressed to this publication will be referred to the source from which authoritative answer can be secured.

Steam Locomotive Practice

By George M. Davies

Brake Shoes With Inserts

Q.—What are the advantages of brake shoes with expanded metal inserts as compared to the plain chilled cast iron shoes for use on locomotives?—E. R. B.

A.—The chief advantages of the brake shoes with expanded metal inserts for locomotive use are:

1—Greater safety, because when shoes break the broken pieces often drop into frogs, switches, under the wheels and along the right-of-way.

2—An improved design of shoe in which the shoe body metal is adequately reinforced and bonded together throughout.

3—Breakage of shoes and losses therefrom reduced to a minimum due to bonding of the wearing metal which holds the body metal of the shoe intact thereby increasing its service life.

4—Higher coefficient values for corresponding brake shoe pressures, regardless of the type of wheel used which favorably influences stopping distance.

5—Greater economy, notwithstanding the higher initial cost due to the fact that such shoes not only wear longer, but can be worn down to the condemning limit with practically no failures from breakage.

Conversion to Oil

Q.—We are contemplating converting some of our freight locomotives having 16,000 gal. 40 ton tenders to oil burners. The 10,000 oil tank is to be placed in the present tender coal space. What are the requirements for safety appliances in making this conversion? —F.R.B.

A.—The United States Safety Appliance Standards for locomotives does not provide specific rules for the application of handrails, grab iron ladders or steps to oil tanks placed in the coal space of a locomotive tender, however, the general practice is to provide equivalent means and safeguards as for passing from rear of tender to the cab:—

(a) Where the rear coal board and coal board ladder above the top of the tank has been removed for the application of an oil tank, and when the height of the oil tank is greater than the height of the tank a suitable ladder and handhold should be provided from top of tank cistern to top of oil tank.

(b) Suitable guardrails should be provided horizontally along top of oil tank, their location depending upon the location of the oil tank filling holes, in the same manner as is generally provided on the top of the water cistern back of the coal board.

(c) A suitable ladder and handhold should also be provided at the front of the oil tank from top of oil tank to the cab deck.

(d) Ladders and handholds and guardrails should conform in detail to those now on the tender to which the application is being made.

Speed Recorder Location

Q.—To what pair of driving wheels should the drive mechanism of the speed recorder be placed—R.E.K.

A.—The drive mechanism of a speed recorder may be connected to take power from any locomotive wheel in contact with the rail. Preferably it should be applied to the first driver ahead of the firebox on the right hand side in such manner that the friction wheel tread will run freely on the center of the tire tread; thus keeping the length of the flexible shaft between the drive mechanism and the instrument in the cab to a minimum.

Cab Handrails

Q.—What are the requirements for the use of toeholds and handrails along the side of the cab?—R.F.W.

A.—It is the general practice to apply toe holds or auxiliary runboards below the sides of the cab with horizontal handholds above the windows on large locomotives where size of boiler and clearance limitations do not allow sufficient room for exit at front of cab. Auxiliary runboards are not required where there are doors on the front of the cab and the passageway through cab is unobstructed.

Steam Locomotive Boilers

By George M. Davies

Is a Brick Arch Necessary?

Q.—Is a firebrick arch necessary in a locomotive boiler?—B.E.K.

A.—Firebrick arches are aids to the combustion process since they prolong the time a particle of fuel, or a volume of unburned gas, will remain in a firebox by lengthening out the path of the gas flow. The firebrick arch also aids the maintenance of high temperature in the combustion space by presenting an incandescent surface to the fuel and gases. Arches are essential in modern locomotive boilers.

Stress Relieving

Q.—Why is it necessary to stress relieve a welded shell of a locomotive boiler which is always under stress due to the working pressure?—M.I.F.

A.—Stress relieving of a welded shell at the time of construction is to relieve the stresses set up in the metal of an object due to the expansion and contraction while being welded.

Fusion welding of boiler plate causes a high temperature to be applied locally in the sheet at the point of weld. The molten metal of the weld is surrounded by the relatively cold mass of metal in the rest of the sheet. The consequent expansion and contraction result in the possibility of setting up more or less severe stresses in the weld or in the metal adjacent to it. Such stresses are referred to as "locked-up stresses." There is no question whatsoever that such stresses do exist. How severe they may be and what their distribution is have not been positively determined, but in many cases, and particularly in vessels of heavy plate thickness, steps must be taken to relieve such stresses if the vessel is to be safe for use.

Long Tube Sheet Ferrules

Q.—What is the purpose of applying long ferrules in the rear tube sheet, making the ferrule ⅛ inch longer than the thickness of the tube sheet and extending through the sheet on the water side?—R.V.K.

A.—Ferrules are made ⅛ in. longer than the thickness of the rear tube sheet so that the ferrule will protrude on the water side of the sheet in order that the ferrule can be enlarged and shouldered on the water side against the tube sheet with a sectional ferrule expander, thereby obtaining a construction that will permit boiler tubes to enter freely without dislodging the ferrule.

Schedule 24RL Air Brakes

ELECTRO-PNEUMATIC BRAKE OPERATION

912-Q.—How does Running and Charging position compare with the automatic operation? A.—Running and Charging position is identical to the automatic operation except that the brake valve handle cannot be placed in release position.

913-Q.—What is the operation for a brake application? A.—The brake valve handle *370* is moved to the right, out of Running position into the application zone.

914-Q.—What results from this movement of the brake valve handle? A.—This movement rotates shaft *257* and engaged selector collar key *253*. Thus, cam *254* is rotated, which moves dog *229*, pusher *336*, and attached lever *333*, the ends of which are positioned on the inlet valve *315* and exhaust valve *329*.

915-Q.—What does the first movement of the cam accomplish? A.—The first movement of the cam causes the exhaust valve *329* to close, cutting off the exhaust opening to "At", atmosphere.

916-Q.—What happens with further movement of the brake valve handle to the right? A.—Further movement of the brake valve handle to the right causes additional movement of the flating lever, now fulcrumed on the closed exhaust valve, to open inlet valve *315*, allowing main reservoir air from passage *30* to flow into chamber *Y* and thence to control pipe *11*.

917-Q.—What happens as the air pressure builds up in chamber Y? A.—As the air builds up in chamber *Y*, it acts upon the spring loaded piston *322*, which forms the exhaust valve seat, and moves the piston and exhaust valve *329* to the left against the force of regulating spring *321*, exhaust remaining closed.

918-Q.—How does the self lapping unit operate to build up pressure in control pipe 11, corresponding to the position of the brake valve handle in the application zone? A.—The exhaust end of lever *333* moves with the exhaust valve and piston until the regulating spring *321* is compressed sufficiently to balance the cam pressure on the lever, after which the application end of the lever moves away from the inlet valve, which is then closed by spring *316*.

919-Q.—Explain the operation further, as air pressure is developed in control pipe 11. A.—Air pressure, as developed in the control pipe by the positioning of the brake valve handle in the application zone, builds up and flows to chamber *B* of the electro-pneumatic master controller.

920-Q.—What takes place as the air builds up in this chamber? A.—Application diaphragm *18* is deflected to the right and thus moves shaft *32* and its control levers *40* and *41*. As spring *24* is compressed, lever *41* first closes release contact (Rel.), after which spring *23* is compressed and lever *40* closes the application contact (Appl.).

921-Q.—With the release and application contacts closed, what happens? A.—The release and application wires are energized.

Diesel-Electric Locomotives*

Q.—What is the recommended procedure for checking crankshaft distortion and how often should it be checked?

A.—Crankshaft distortion and main bearing alignment should be checked at intervals of about six months or 50,000 miles. The recommended method of measuring distortion involves checking deflection of the shaft between the crankshaft cheeks by use of an indicator with the shaft positioned first at top-dead-center and then at bottom-dead-center. A maximum allowance of .003 in. is set up for the difference between the top and bottom measurements on engines coming from the factory. On reconditioned engines this allowance is increased to .005 in. The practice of shimming the bedplate to reduce the crankshaft deflection is not recommended. If the crankshaft deflection is excessive the only corrective action is line-boring the bedplate. Excessive tightening of the chain drive will cause excessive crankshaft deflection.

Q.—A seven-month-old switcher required new bearings. Should a deflection test be made after the overhaul has been completed?

A.—Yes, a deflection test should be performed as it requires only a few hours. If tolerances are exceeded the bedplate should be line bored. When new main bearings are installed the crankshaft should be checked for deflection to assure that the bearings have been properly applied.

Q.—What is the best method of checking cylinder liners for roundness?

A.—Most of the wear occurs at the top of the liner. The amount of wear should be determined by checking the cylinder diameter at three or four positions by use of an inside micrometer.

Q.—Does anyone have cylinder liners which have become worn at the top of the ring travel?

A.—Liner wear at the top of the ring travel is normal for all engines. The liner should be replaced if the shoulder cannot be cleaned up within the required limits.

Q.—Is it recommended to have a liner in that condition replated?

A.—It has been found to be impractical to recondition a worn liner by plating in most instances because of the high cost involved in preparing the liner for replating. Replacement of the liner will prove more satisfactory and economical.

Q.—Can various size wheels be used under a switch engine and what are the allowable limits?

A.—The allowable variation in wheel size of wheels operating on the same truck is 1 in.

Q.—How would a broken metering valve affect the engine speed?

A.—A broken metering valve will cause the engine speed to drop because of overloading due to the oil ports in the carbonstat becoming blocked if the metering valve fails in that position. In the event that the valve fails when the ports are line-in-line, the engine will hunt.

Q.—Does the size of the hole in the pipe leading from the Buda pump to the nozzle tip make any difference when testing 660 to 1,000 hp. nozzle tips?

A.—There is a difference in the hole diameter between the super-charged and normally aspirated engine. It is important that the correct pipe be employed with the nozzle tester for each type of nozzle being tested. The supercharged engine has an inside pipe diameter of .165 in. and the normally aspirated engine has a .120-in. inside diameter fuel line.

Q.—How can external water leaks be corrected?

A.—On the original VO engine liners a tight fit was not used and leaks would result if the head seals were not tight. The newer, tight fit, liners eliminate the possibility of leaking almost completely. If a leak should develop it will be necessary to lap the seat and the liner to obtain a water tight fit.

Q.—How would a broken A2B actuator valve diaphragm affect the engine speed?

It would produce a maximum pressure at the actuator thereby preventing top engine speed both with or without load.

Q.—What is the control rack setting in idle, full load and shutdown positions?

A.—On the six cylinder 600 series engine an 8½ to 9 mm. setting is used for idle position for both the Bendix and Bosch type equipment. The full load setting, however, is different, the Bosch equipment having a full load setting of 25 mm. whereas the Bendix equipment is set at 23 mm. For the shut-down setting 4 mm. is used for both the Bendix and Bosch.

Q.—What benefits are obtained through use of precision type bearings over use of semi-precision bearings?

A.—Precision main bearings which have been properly installed have the advantage of eliminating the necessity of adjusting bearing clearances by means of shim adjustment thereby insuring a better and simpler installation.

Q.—What is the significance of the 0.5 to 1.5 lb. per sq. in. minus pressure in the engine crankcase as far as the condition of the engine is concerned?

A.—A new engine will have a minus crankcase pressure ranging from 0.5 to 1.5 lb. per sq. in. As the engine becomes older this negative pressure will decrease and may become slightly positive because of the increases blowby due to worn piston rings and liner wear.

Q.—What indications will an engine given when there are worn pins and linkage between the actuator and governor?

A.—Worn pins and linkage will make it difficult for the engine to hold its speed settings and the engine will have a tendency to hunt.

Q.—What is the procedure for storing a Baldwin locomotive for a period of 30 to 60 days or longer?

A.—Complete draining of the locomotive is required if it is to be stored outside or in an unheated building. The electrical leads to the battery should be disconnected to prevent drainage of the batteries. It is also advisable to apply a protective coating on all engine parts which are subject to deterioration.

* These questions and answers relating to Baldwin Diesel-electric locomotives were submitted following a talk at the September meeting of the Chicago Railroad Diesel Club by Albert Hoefer, Baldwin Locomotive Works, on the maintenance and operation of Diesel Engines.

NEW DEVICES

Grinders for Finishing Car Axles

Many features of value in grinding medium to large-sized parts, including railroad car axles, are incorporated in the new 14-in. and 16-in. plain grinding machines recently introduced by Cincinnati Grinders, Inc., Cincinnati 9, Ohio. The grinding wheel spindle of the illustrated unit runs on Filmatic bearings which consist of multiple segments, fixed axially but free to rock radially a slight amount.

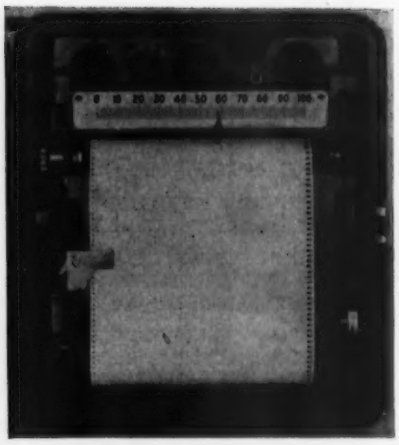
Lubrication of these bearings is automatic, with circulating filtered oil. It precedes spindle rotation, and initiates the starting thereof through a pressure switch. Should the lubrication system fail, the grinding-wheel drive-motor automatically stops.

The table is traversed by means of a rack and pinion and a simple drive from the motor. Traverse rates are infinitely variable between 3 and 120 in. per min., through a d.c. motor controlled electronically from an a.c. power source.

Its headstock is a dead-spindle, d.c. motor-driven unit, having a No 13 Browne & Sharpe taper hole in the spindle. Spindle speeds are rheostat controlled and variable from 40 to 144 r.p.m. for the 14-in. machine, and 20 to 72 r.p.m. for the 16-in. unit. Matched V-belts and chain transmit power from the motor to the face plate. A gravity lubricating system at the front of the headstock, protects running parts.

All operating elements are within convenient reach of the operator. Electrical control buttons and rheostats are grouped in a panel which is labeled for quick reference. Every unit is adequately powered. A 20-hp. motor drives the grinding wheel spindle through V-belts. The headstock of the 14-in. grinder is driven by a 1½ hp. motor, and a 2 hp. motor for the 16-in. unit. A 1 hp. motor drives the table, and ⅓ hp. motor is incorporated for each of the two lubricating pumps.

Tinning, strip mill, foil, precious metal and similar cambered rolls can be ground on these machines when equipped with swivel table type roll cambering mechanism. This equipment can be supplied to the 36, 48 and 72-in. length machines. Power-cross feed to the wheelhead is also available for roll grinding operations or any other work which requires frequent and lengthy cross-traverse movements.



Strip-Chart Strain Recorder

A newly developed strip-chart strain recorder for use in stress analysis with Baldwin's type SR-4 bonded resistance wire strain gages is announced by The Baldwin Locomotive Works, Philadelphia 42, Pa. The recorder is equipped with a 9½-in. wide chart scale, two chart speeds of 6 and 180 in. per hour, and has accommodations for a two-arm and four-arm strain bridge. Slowly varying strains can be recorded for as long as 10 days without changing the chart.

The illustrated instrument is a special adaptation of the Leeds & Northrup Speedomax type G, model S recorder with adjustments for strain gage characteristics, strain ranges, and for the Wheatstone bridge circuit. Basically, the circuit is a d.c. potentiometer type for measuring output of a strain gage bridge.

A feature of the circuit is the arrangement for directly standardizing the potentiometer range in proportion to the voltage supplied to the strain gage bridge. The circuit is adjusted by means of a two-position bridge supply switch (3 volts or 6 volts) and by a rheostat calibrated in gage resistance from 50 to 500 ohms. Microinch ranges of the recorder are 1,000, 2,000, 5,000, and 10,000 on the 6-volt bridge and 2,000, 4,000, 10,000 and 20,000 on the 3-volt bridge. A zero adjustment control and range extender switch provide approximately plus or minus 15,000 microinches per in. movement of the balance point with 120-ohm gages.

Magnetic Controls For Crane Operation

A new system of magnetic control that makes it possible for a crane operator to remain seated during all crane operations has been engineered by the Whiting Corp., Harvey, Ill. It offers simple conversion from drum-type controllers.

This control system does away with bulky, drum-type controllers that obstruct the operator's vision. Master switches of the magnetic control occupy very little space and give the operator full vision in all directions. Furthermore, they require only a flick of the finger tips, instead of a heavy pull, to operate.

The system is only slightly more expensive than the drum-type control and much less costly than conventional mag-

netic control. Heavy, over-size, clapper-type contactors have been replaced by solenoid contactors. Heavy slate panels and sheet metal enclosures have been eliminated. The solenoid contactors never need filing or sanding. Automatic time-delay protects the motors but allows maximum motor effort.

Single-Phase Capacitor Motors

An integral-horsepower capacitor motor for use wherever power supply demands single-phase operation has been announced by General Electric's Small and Medium Motor Divisions.

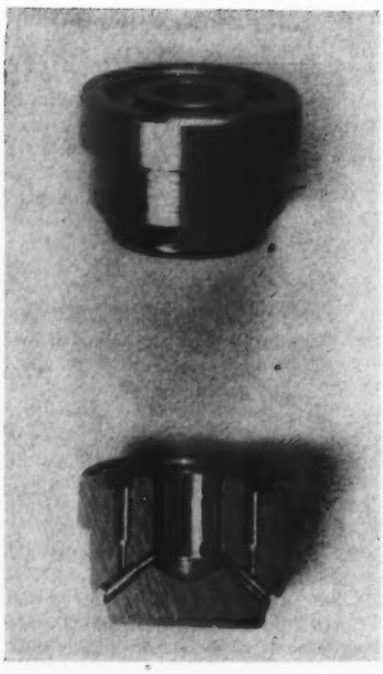
Of cast iron construction, the motor presents a smooth, streamlined appearance. To minimize overall dimensions, capacitors are mounted in the base of the motor, and there is no conduit box on the side. The conduit box has been replaced by a built-in terminal board inside the end shield for easier wiring.

The motor is compact and lightweight, weighing 15 to 20 per cent less than its predecessor. It has a totally enclosed built-in starting switch to keep foreign matter from the contacts, and new centrifugal mechanism designed for long, dependable life.

In ratings from ½ to 5 hp., these high torque motors are available in two types: type KCS, capacitor-start, and type KCR, capacitor-run. These differ only in starting current, not in output characteristics. The Type KCS motor is designed for 115/230 volts, while the Type KCR motor is a single-voltage, 230-volt design.

Steam Generator Spray Nozzle

The illustration shows enlarged views of a new stainless steel atomizing spray nozzle used in Vapor-Clarkson steam generators, made by the Vapor Heating Corporation, Chicago. Stainless steel replaces bronze in this nozzle because of its ability to withstand high temperatures without distorting the six combined air and fuel-oil atomizing holes.



After machining and drilling operations, the nozzle is flame-hardened to resist abrasive wear, followed by lapping, testing and sealing in individual transparent containers.

A projecting head has been added to the lower and smaller portion of the nozzle below the atomizing holes to protect these holes while the nozzle is being removed from the holder. This is important in that damage to any one of the six .040-in. diameter holes will affect the output of the steam genuerator. From 20 to 55 gal. of fuel oil pass through these six holes in an hour when a 4,500 lb. per hr. steam generator is operating. Efficient atomization is accomplished by using 70-lb. air pressure in the center section of the nozzle and 20- to 90-lb. fuel oil pressure on the outer holes. The air literally slices off tiny drops of oil which are broken up and atomized in a volume of air sufficient to form an efficient burning mixture.

Highly Ductile Carbon Cast-Iron

The Chambersburg Engineering Co., Chambersburg, Pa., is now producing large and small castings of its new material called Ductile Cecolloy for component parts of many of its products and is also marketing the material for heavy job-casting. Castings weighing up to 40,000 lb. which possess high tensile strengths have been produced.

Basically, the material is a high-carbon cast-iron, treated with magnesium to transform the graphite from the normal flake to spheroidal form. The metallic matrix of the material is essentially steel, which can be produced with appropriate microstructures to give desired physical properties. It is also subject to heat treatment for alteration and improvement of the physical properties.

This product can be produced to specifications within the ranges of the following physical properties as cast: tensile strength 60,000 to 80,000 lb. per sq. in.; yield strength 40,000 to 60,000 lb. per sq. in.; elongation 0 to 15 per cent and modulus of elasticity from 22,000,000 to 25,000,000 lb. per sq. in.

Its machinability is equal to cast steel and fine finishes are easily attained thus resulting in cost savings and increasing the wear resistant properties.

Chain Type Electric Hoist

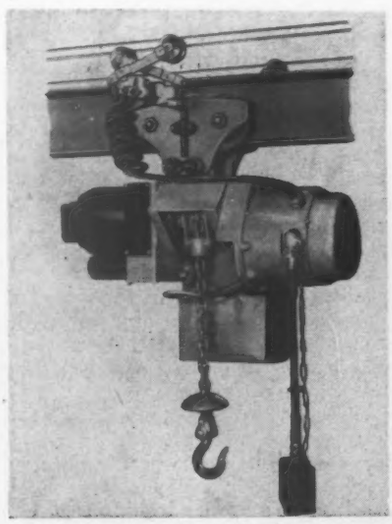
The illustrated hoist presents several new innovations. Its principal distinction is that the link chain, over an electrically driven sheave, protects the load. This permits long lifting lengths since the wound up chain collects in a metal container as the hook rises.

Lifting speeds up to 41 ft. per min., an upper limit stop and a wide pick-up angle are additional features of the electric hoist introduced by The Yale & Towne Mfg. Co., Philadelphia 15, Pa.

It is available in load capacities of 500, 1,000 and 1,500 lb. and will lift loads through any height up to 40 ft. The single-strand load chain engages six pockets of the sheave to move and hold heavy loads with minimum chain friction.

The hoist hook can reach out as far as 30 deg. from the vertical to pick up loads. This pick-up angle enables an appreciable reduction of time and power consumed in inching the hook up or down for close spotting.

The limit stops prevent over-travel of

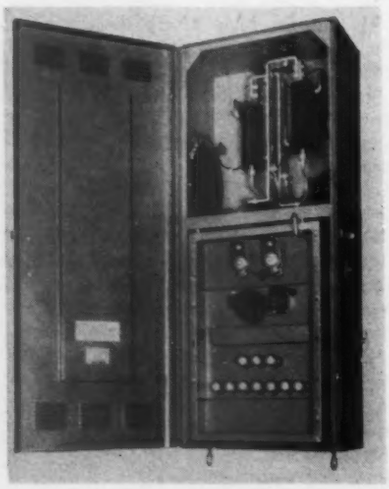


the hook when lifting or lowering. They operate when the hook reaches predetermined levels and break the electrical circuit to return the push-button controller from either the "up" or "down" position to "neutral."

The hand controller is suspended by a light-gauge chain so that neither electric cable nor electrical connections take the weight of the controller. The control box is situated at a level convenient to the operator and the flexible control cable carries only switch-energizing current, and not load current.

Resistance Welding Control

Two new, all-electronic, high-speed resistance welding control equipments, for synchronous and non-synchronous operation, are available from Westinghouse Electric Corporation. The equipments have no moving parts in power and control circuits except initiation and solenoid



relays, offering advantages in weld quality, welding costs, and ease in which welds are produced.

Basic control panels consist of the plug-in Rectox rectifier tube firing panel (for non-synchronous units) or a heat-control firing panel (for cynchronous units). These basic controls include also the 3-B sequence weld timer, which controls squeeze time, weld time, hold time, and off time for single impulse spot welding. It provides non-synchronous timing with repeat and non-repeat control and non-beat control. The substitution of a precision weld-time panel for a 3-B or 5-B sequence weld timer provides synchronous precision control when the heat control panel is used.

These combinations are sufficient for many common resistance welding control requirements. However, space is also provided for the addition of auxiliary control panels to meet specific requirements.

Walker-Peerless Diesel Oil Filter

A replacement cartridge for Diesel engine oil filters, made by the Walker Manufacturing Company, Racine, Wis., and now being sold to the railway field by the Peerless Equipment Company, 332 South Michigan avenue, Chicago, embodies a patented Laminar construction with many alternate layers of pure wood cellulose fibre matrix and dispersion strips, said to remove foreign particles down to .2 of a micron. The new filtering material and principle are designed to give exceptionally uniform performance, positively avoid chanelling, have no affect on active detergents or additives and assist in the control of moisture and crank case condensation.

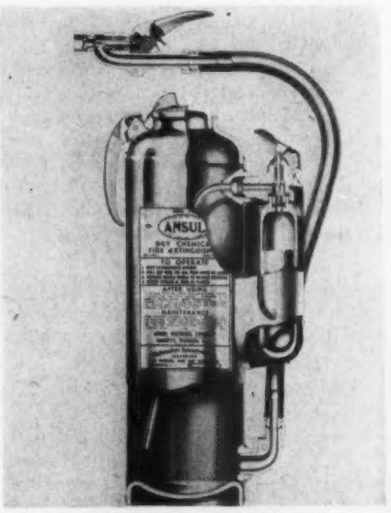
The primary filtering matrix of the Walker-Peerless cartridge is a bed of fibres, air laid uniformly by special process on a continuous thin wood cellulose fibre sheet which serves as a dispersion strip. A double layer of strips on top encloses the matrix which is then spirally wound around a center tube and covered with a sock brought around the ends and locked to the center tube by a built-in snap ring construction.

The center tube, made of heavy-gauge steel with a lock seam and thoroughly rust proofed, is double wrapped with canton flannel as added protection against any possible filter medium migration into the oil stream. The outside covering of the cartridge is a strong, white knitted cotton socking material. The extra length of filtering material confined in the sock gives positive compression end seals to prevent by-passing of the oil.

The construction described is said to combine for the first time three essential kinds of filtrations: namely, surface, depth, and progressive, the first being accomplished by the outer dispersion strips, the second by the numerous layers of spirally-wound basic filtering material and the third by the fact that these successive layers are progressively more compact from the outside to the center and hence selectively remove smaller and smaller particles as contaminated oil passes in to the center tube.

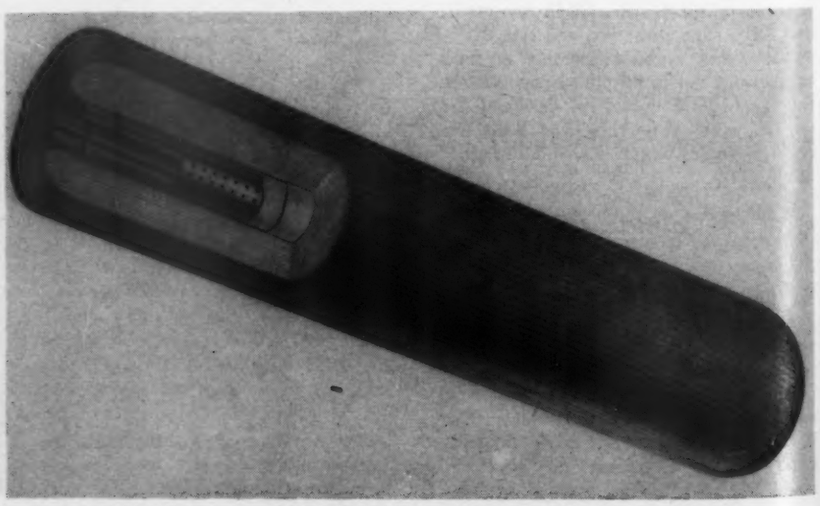
Dry Chemical Fire Extinguisher

An improved dry-chemical fire extinguisher for combating flammable liquid, gas and electrical fires and said to be com-



pletely watertight has been introduced by the Ansul Chemical Co., Marinette, Wis.

The illustrated unit has 12 new design features incorporated into it. Chief among these are the nozzle and cartridge receiver. Specially designed seals inside the nozzle and receiver have made these two vital parts water-tight. Of importance is the fact that the extinguishers can be recharged at the scene of a fire in a few minutes, providing continuing protection.

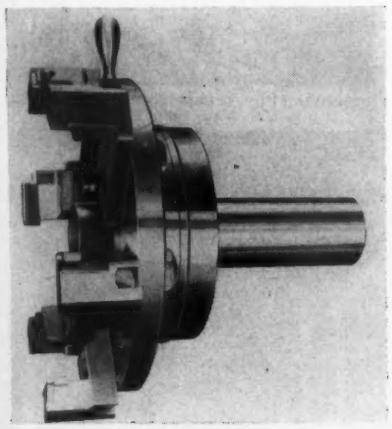


Other important changes in the model B extinguisher are new threaded hose connections, new cartridge guard finger grip and a redesigned carrying handle. Performance has been improved by these engineering developments and maintenance has been simplified.

For convenience and portability, the extinguishers are available in 20 and 30 lb. sizes.

Die Head For Valve Seat Rings

This die head is normally furnished without the internal trip when the valve seat rings are chucked and faced in relation to the chuck. The arrangement permits setting the stops on the turret so as to allow the normal pull off action to trip the die head. These are features of the illustrated unit designed for an internal-trip type die head for threading valve seat rings up to diameters of 14¾-in. and introduced by the Landis Machine Co., Waynesboro, Pa.

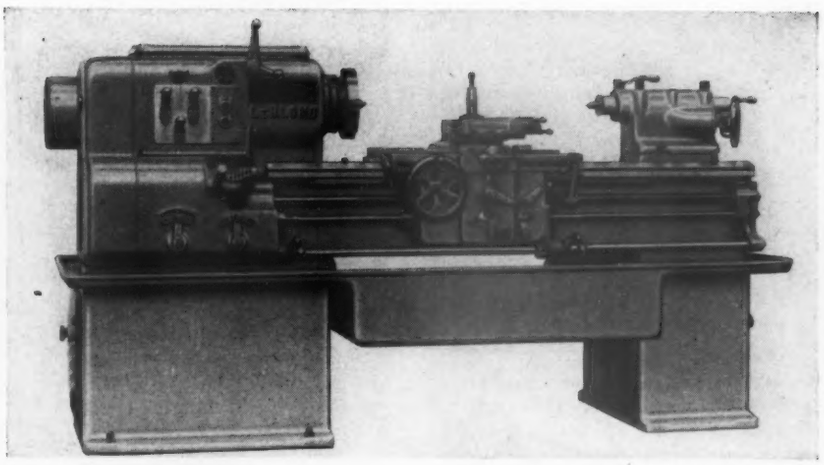


For thread sizes larger than 9 1/16-in. diameter, an enlarged closing ring is mounted on the head to support the oversize chaser holders. Varying thread lengths of different valve seat rings can be taken care of by the height of the oversize holders.

The chasers used are six per set having a 30 deg. short roughing and finishing throat. The coarsest pitch recommended is eight threads per in. The chaser holders have a diametrical adjustment of approximately 5/8-in. on the larger size. This permits the same chaser holders and chasers to be used for different diameters.

Heavy Duty Engine Lathe

The line of heavy-duty engine lathes including 12, 14 and 16 in. swing sizes with 24 spindle speeds, and a 20 in. size with 32 spindle speeds has been introduced by The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. The 14-in. model is illustrated.



These lathes are arranged for higher powered motors than previous models: the 12- and 14-in. sizes use a 7½-hp. 1,800-r.p.m. motor; the 16-in. use a 10- or 15-hp. 1,800 r.p.m. motor; and the 20-in. size utilize a 15- or 20-hp. 1,200-r.p.m. motor.

An enclosed quick change box, automatically lubricated, has been included in the new design. Sixty feed and thread changes are obtained through hardened alloy steel gears; shafts are supported on anti-friction bearings.

The compensating vee-way principle has been retained on the bed which is fitted with replaceable hardened and ground steel bed ways front and rear. Its apron is of one-piece construction with positive jaw feed clutch and single lever length and cross feed control. The tailstock is the offset thrust-lock type.

The line of heavy-duty engine lathes also includes four larger sizes, the 25, 32, 40 and 50-in. types, all of same basic design as the illustrated unit.

Cleaning Filters for Air-Conditioned Coaches

Self-housed cleaning and coating equipment for processing filters from air conditioned coaches has recently been developed by the R. C. Mahon Company, Detroit, Mich. The cleaning unit, housed in an all-weather enclosure with suitable windows and doors, contains complete equipment for cleaning and oil-coating filters.

The processing is done in two operations. In the first operation, the filter is dipped into a tank of softening solution. It is then placed in a spinning chamber and the sliding door is closed. The filter rotates under pressure sprays of clean water until all dirt is knocked out of it. A pipe connection is provided for piping waste water to catch basin or sewer.

The second operation consists of placing the filter in the other compartment which has a tank where the viscous oil for coating the filter is maintained at a constant temperature by means of a thermostatically controlled electric immersion heater. The clean filter is dipped momentarily in the oil bath, then moved to the spinning chamber. The sliding

Exterior of the Mahon filter-cleaning unit and (below) dip tanks and spinning equipment with electric controls

door is closed, and a blower started which provides a stream of electrically heated air to maintain the filter at a suitable temperature to insure flowing of the oil. The spinner is then started and the surplus oil is thrown off, draining back into the dip tank.

The sliding doors are equipped with switches to prevent operation of the spinners while the doors are open.

High-Tensile Cleaning Hose

A new type of rubber hose designed especially for carrying hot oil and water at pressures up to 200 lb. per sq. in. and used to clean steam locomotives has been announced by the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown 1, Ohio.

The product named Engine Cleaner Hose, has a Reprene tube amply reinforced by three braids of high tensile cord and compounded to resist oil, hot water, abrasion and sunlight. Angle of braid is controlled to give the hose maximum pressure resistance, and each braid is separately insulated and protected from chafing. In a test installation, being used 24 hours a day at pressures up to 200 lb. as a carrier of hot oil and water to clean steam locomotives, the hose has been in service more than six months.

Air-Powered Portable Mixing Motor

Designed for a wide range of mixing, emulsifying or stirring operations is this versatile portable mixing motor, recently announced by The Aro Equipment Corp., Bryan, Ohio.

The mixing motor can be quickly clamped into position on the edge of a tank, drum, barrel, pail or other vessel. A swivel clamp permits easy adjustment to desired angle. Motors may be selected in a choice of five models with speeds of 500, 1,200, 2,800, 4,500 and 17,000 r.p.m. which enables users to select a model best suited to the viscosity of the fluid to be agitated.

Unusual features of the tool include: fully adjustable mounting clamp; easy needle valve adjustment for complete speed control; and the motors are positively explosion-proof, and chemical fumes do not harm the motor.

The mixers are used for agitating solutions in plating tanks, in oil and water quench tanks, and in preparing drawing compounds.

The 500 and 1,200 r.p.m. motors are 6½-in. long minus valve and weight is 2 lb. 6 oz. The motor is fully ball-bearing mounted, in an all-steel housing with corrosion-resistant finish. Its air valve

may be mounted on side or end inlets for greatest convenience.

Mounting clamp is made of special aluminum alloy, equal in strength to malleable iron, with blue-gray hammered metallic finish. It swivels on ball socket, permitting angular adjustment of unit within 90-deg. arc, and can be rotated horizontally a full 360 deg.

Stirring rods are available in ¼ and ½-in. diameters, in lengths of 12, 18 and 24 in. Aluminum propellers furnished in left-hand or right-hand pitch, in standard sizes of 2½, 4½ and 8-in. diameter, can be used in pairs or individually on the stirring rod.

Long Bed Geared Head Lathe

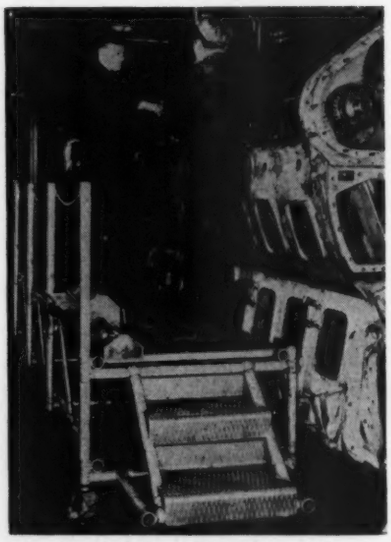
Geared head lathes in 20 in. capacity and manufactured by the King Machine Tool Division of American Steel Foundries, Cincinnati 29, Ohio, are now being produced in extra long bed lengths. These 20 in. lathes, both general purpose and gap types, are available in bed lengths up to 20 ft. They are designed to handle a full range of work, including long, light weight pieces ordinarily machined on heavy-duty lathes.

These Sebastian lathes are produced in 12 and 16 in. capacities as well as 20 in. sizes in general purpose, clutch and brake and line-shaft drive types. Gap and metric screw types are also made in 16 and 20 in. sizes.

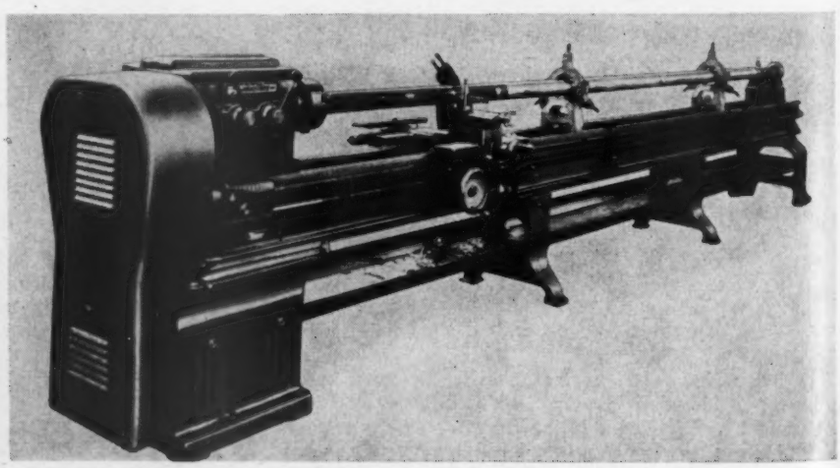
The lathes are equipped with 8-speed geared head, having Timken tapered bearings on all headstock shafts and Timken bearings on the spindle. Other construction features include reverse in apron for feeds; knob control handle for apron-length feed friction; 54 feed and thread changes and 0.0005 in. accuracy at each point of alignment. A large number of items are furnished as standard equipment.

Aluminum-Alloy Repair Stands

The illustrations show two new types of aluminum alloy repair stands now being



Aluminum alloy scaffold used in repairing Diesel engines



Aluminum platform and steps leading to Diesel engine room

made for railroad use by Up-Right Scaffolds, 1013 Pardee street, Berkeley 10, Calif. This modern lightweight equipment is used to give easy access to Diesel locomotives and for overhauling engines after removal from the locomotives for major repairs.

The platforms are mounted on locking casters, of Up-Right exclusive patented design, which permits rolling each structure to the exact location desired and then locking it securely in place. Movement by hand or foot of the single brake lever locks both the wheel action and the swivel action of the caster. The entire structure is made of heat-treated aluminum alloy which is strong and only about one-third the weight of steel. Structural members are tubular. Platforms and steps are made from diamond tread plate, welded or riveted to the supporting members. Safety railings are supplied to provide maximum worker security.

The use of aluminum alloy materials for this construction eliminates rust and corrosion. It also promotes lightweight and easy mobility providing large savings in labor costs. Complete information is available from the manufacturer, who has factories both in Berkeley, Calif., and Teterboro, N. J., with factory-trained representatives in all principal cities.

Fluorescent Color Range Extended

The General Electric's Lamp Department, at Nela Park, Cleveland, Ohio, has announced the development of fluorescent lamps which, for the first time, bring out the full beauty of all colors, and are complimentary to people's complexions. They have been made possible by the development of a special fluorescent powder, designated the DR phosphor.

Named "de luxe cool white" and "de luxe warm white," the two new lamps have an inner coating of the DR phosphor, composed of a double-activated calcium phosphate.

The new line of G.E. fluorescent lamps for general lighting purposes consists of four lamps, two of which provide a cool atmosphere, and two a warm atmosphere. The new lamps are the "standard cool white" and "de luxe cool white," and "standard warm white" and "de luxe warm white." It is the "de luxe" lamps which contain the DR phosphor. Thus the present "4500 white" lamp becomes known as the "standard cool white" lamp in the new line, and the "warm tint" becomes the "standard warm white."

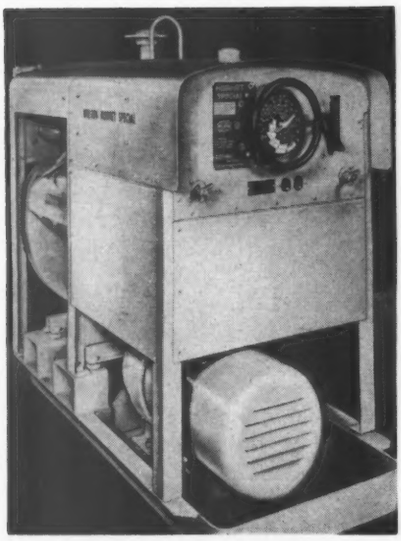
This phosphor development enables the manufacturer to simplify for the consumer his task of selecting the proper fluorescent lamps to fill his lighting requirements. First he decides whether he wants a warm or cool atmosphere. Then he determines which is more important to him, best color rendition or maximum light.

Engine-Driven, 200-Amp. Welder

An engine-driven arc welding machine known as the 200-amp. Hornet Special has been announced as the most recent addition to the line of arc welders made by Air Reduction Sales Co., New York. The machine combines the manufacturer's 36A generator with a 4-cylinder, 31-hp., air-cooled Wisconsin engine.

The generator has a welding range from 40 amp. at 20 volts to 250 amp. at 40 volts.

The generator is built as a two-bearing unit. Double shields keep bearings dirt-free and hold grease in. The control wheel



mounted on the panel shows accurate current markings—readily obtained by setting the pointer located in the center of the wheel. This hand wheel has five positions, with ample overlap to insure fine settings from minimum to maximum output of the machine. The need for meters is eliminated.

The generator is self-excited with excitation of the main field supplied by an auxiliary brush. This insures rapid recovery voltage over short circuit. Welding terminals are readily accessible with ample space between them to prevent accidental shorting of welding cable lugs.

The air-cooled engine has magneto ignition with impulse starting. Hand cranking eliminates battery maintenance.

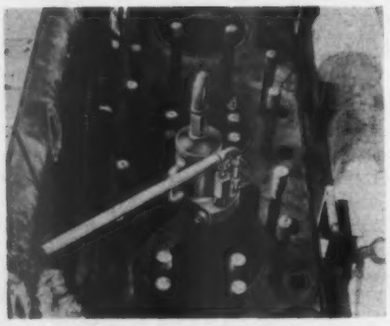
The complete unit is 58½ in. long, 25⅝ in. wide, and 47 in. high. It weighs 825 lb. It is equipped with a full-length drip-proof canopy. A lifting eye is provided on top. Two-wheel, trailer-type running gear, with 4-ply pneumatic tires and a 38 in. long drawbar, is available as optional equipment.

Hydraulic Pulling Equipment

Hydraulic equipment with both pushing and pulling action for applying and removing freight car, Diesel and steam locomotive parts, is available from Templeton, Kenly and Company, Chicago 44. The product is trade-named the Simplex-Jenny and is manufactured in capacities of 30, 60, 80 and 100 tons. The weights are 36 lb. for the small model, 96 lb. for the 60-ton model and 78 lb. for the 80- and 100-ton models. The travel is 3¼ in. for all models but the 60-ton size, which has a 6-in. travel.

The Simplex-Jenny features a patented center-hole power principal to eliminate torque. An attachment known as the Tru-Pul is used to extend the straight line pull of the ram. This accessory has a capacity

Set-up for pulling traction motor pinions



Removing cylinder liners with the Simplex-Jenny

of 30 ton, a travel of 4 in. and a weight of 14 lb.

Among the typical railroad shop jobs which can be performed with this tool is the application or removal of traction motor pinions. On threaded pinions the pull rod screws into the pinion threads; split collars are used for unthreaded pinions. The 60-ton model is applicable to such jobs as installing roller bearings on steam locomotive crank pins.

Lighter jobs are performed with the 30-ton jack. This model can handle such jobs as pulling or inserting Diesel cylinder liners and valve stem guide bushings, collapsing draft gear springs and radial buffer springs.

Coolant Heater for Diesel Locomotives

An oil-burning heater for maintaining Diesel-engine cooling water temperatures between 80 and 100 deg. F. when the locomotive is parked, has been announced by Anchor Post Products, Inc., 6500 Eastern avenue, Baltimore, Md.

The heater, which operates from a 64-volt d.c. power source, is a completely automatic, self-contained hot water heating unit. The output of the heater is approximately 75,000 B.t.u. per hour. It is a complete package and includes all controls, water jacket, heat exchanger, firing head, motors, blowers and pumps.

The heat exchanger is a modified Scotch type marine boiler, employing a 5-in. primary combustion pass with sixteen one-in. secondary tubes. The primary 5-in. pass fires into a breeching, from which the combustion gases move back through the sixteen tubes to the exhaust header and then to the exhaust pipe. Water completely surrounds the primary tube, the sixteen secondary tubes and the breeching.

Combustion is by means of a modified pressure type oil burner. This consists of a standard oil burner nozzle, with oil being supplied at 80 lb. pressure. Ignition is accomplished by means of two ignition electrodes which are placed above the oil spray. Air is rotated and regulated by means of a spiral and an air regulator device.

The electric motor on the heaters drives a blower wheel, a pump, and a set of automotive type breaker points. The blower wheel supplies the air for combustion and the fuel pump supplies fuel at 80 lb. per sq. in. The heater fuel pump is a gear type pump which will pull approximately 10 in. of mercury vacuum for lifting purposes. The ignition system consists of a heavy duty coil, breaker points and condenser. The coil supplies ignition only for starting, and is then cut off. The coil supplies 5 milliamperes at 18,000 volts for ignition.

The control box on the heater contains all the relays which control the operating sequence. A safety switch is also provided which will shut the heater off in the event of a combustion failure. A high temperature limit is supplied in the event the heater overheats, due to lack of circulation. A low water cut-off also is provided, which will shut the heater down in the event of low water in the heat exchanger.

An aquastat, normally installed at the coldest point in the engine, controls the heater's *On* and *Off* operation. An electric motor-driven circulator circulates the water through the engine and the heater, insuring that all parts of the water system are kept warm.

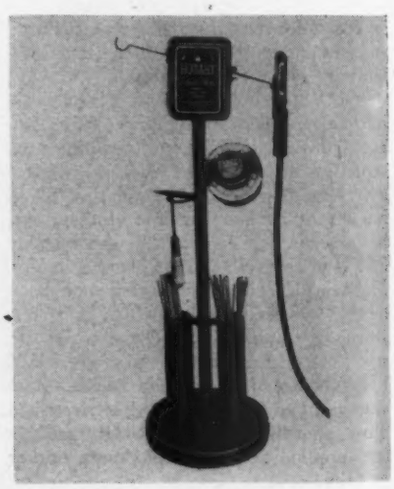
The total weight of the heater is approximately 130 lb. The current drain of the heater, at 64 volts d.c., is 1.9 amp. running with the circulator. The starting current of 6.8 amp. is maintained for a matter of only about 10 seconds on each start. The units are also available for operation on 12, 24, 32 and 110 volts d.c. and 110 volts a.c.

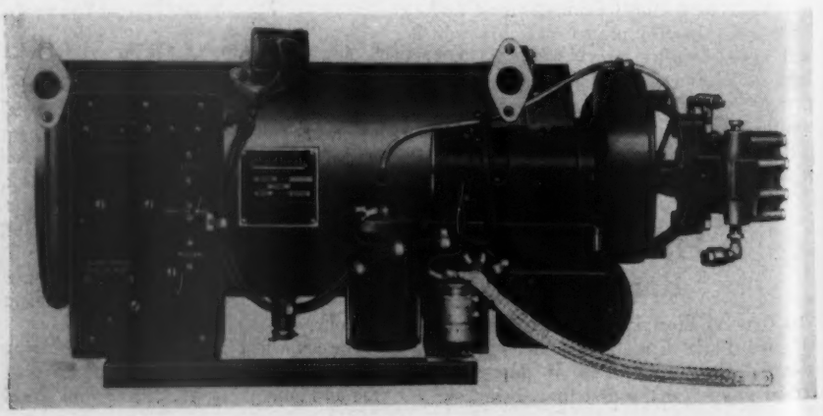
Remote Control for Welders

A stop-start switch mounted on a stand, called the Electro-Mizer, is being made by Hobart Brothers Company, Troy, Ohio.

The weight of an electrode holder, when hung on either of two projecting arms, breaks the circuit and shuts off the welding machine. When the electrode holder is again picked up, the switch automatically restarts the arc welding machine. Thus, the machine only runs when welding is being done. It can be connected to any motor-generator welder equipped for pushbutton starting.

In addition to the electrode holder and switch, the device provides a convenient place for a remote-control rheostat, electrodes, chipping hammer, wire brush, etc.





NEWS

Radiant Heating Of Railroad Cars

THE "project engineer of heating and air conditioning, Research & Development Department, Pullman-Standard Car Manufacturing Company" referred to in the footnote to the article on Radiant Heating of Railroad Cars beginning on page 123 of the March, 1950, issue is Dr. M. L. Ghai.

1949 Freight Train Performance

A NEW high record in operating efficiency, as reflected in freight-train performance, was attained by American railroads in 1949, according to William T. Faricy, president of the Association of American Railroads. Mr. Faricy cited complete reports for last year which showed that more tons of freight were moved more miles per train-hour than ever before, and that the number of cars per train and the average speed also were greater than ever before.

Tons of freight moved one mile for each hour of freight-train operation averaged 19,023 ton-miles in 1949, compared with the previous high of 18,779 ton-miles in 1948, and 10,580 in 1929. The performance in 1949 was greater by 8 per cent than the wartime record of 17,623 ton-miles per hour in 1944.

The average freight train moved 56.8 cars in 1949, compared with 54.5 cars in 1948 and 53 cars in 1944. Freight trains on the average moved more than 4 per cent faster in 1949 than in 1948, and nearly 8 per cent faster than in 1944.

"This new high record in freight train operating efficiency took place despite a lower volume of traffic in 1949 due, in part, to a reduction in coal shipments," Mr. Faricy pointed out. He added: "It was made possible, however, because of improved operating methods, larger and more efficient locomotives, better freight cars and improved signalling and other devices.

Start Research Program to Extend RR Electrification

FOUR major industrial groups have started a jointly financed co-operative research and development program aimed at greater application of railroad electrification. The groups include railroads, electric equipment manufacturers, coal interests and the electric light and power industry. The administrative sponsor of the program is the Edison Electric Institute, and supervision will be conducted by the recently appointed Joint Committee on Railroad Electrification.

The first phase of the program is a technical and economic investigation to be made by the Battelle Memorial Institute, Columbus, Ohio. Areas of research are problems of power supply, including overhead lines and substations, locomotives, signal systems and electric control. During the year, Battelle will attempt to develop ideas and recommendations to make the extension of railroad electrification still more economically feasible and competitively attractive. The results of this technical and economic study will then determine the practicability of a full scale research and development program to provide improved methods, facilities and equipment necessary for much greater railroad electrification.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MARCH ISSUE

DIESEL-ELECTRIC LOCOMOTIVES

Road	*No. of units*	*Horse-power*	*Service*	*Builder*
Chicago & North Western	30 "A"[1]	1,500	Freight	Electro-Motive
	4 "A"[1]	2,250	Passenger	Electro-Motive
	5[1]	1,600	Road switch	Fairbanks, Morse
	2[1]	1,200	Switching	Fairbanks, Morse
	3[1]	1,600	Road switch	American Loco.
	10[1]	1,000	Switching	American Loco.
Cincinnati Union Terminal	2	750	Switching	Lima-Hamilton
Erie	2[2]	1,500	Road switch	American Loco.-Gen.-Elec
	2[2]	1,500	Road switch	Baldwin Loco.
	2[2]	1,500	Road switch	Electro-Motive
	1[2]	1,000	Yard switch	Electro-Motive
Union Pacific	10[3]	2,250	Passenger	Electro-Motive
	25[3]	1,200	Terminal switch	Electro-Motive

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Chicago, Burlington & Quincy	500[4]	50-ton box	Co. Shops
Detroit, Toledo & Ironton	250	50-ton box	Greenville Steel Car
Gulf, Mobile & Ohio	100	70-ton covered hoppers	American Car & Fdry.
Lehigh Valley	100[5]	70-ton covered hoppers	Bethlehem Steel
	50	70-ton flat	Co. Shops
Minneapolis, St. Paul & Sault Ste. Marie	75[6]	70-ton hopper	Co. Shops
Missouri-Kansas-Texas	500[7]	50-ton box	American Car & Fdry.
Missouri Pacific	100[8]	70-ton hopper	Co. Shops
New York Central	1,500[9]	55-ton box	Pullman-Standard
	1,500[9]	55-ton box	Despatch Shops
	1,500[9]	70-ton gondola	Despatch Shops
Norfolk & Western	1,000	70-ton hopper	Co. Shops
Northern Pacific	500	50-ton box	Co. Shops
	50	Caboose	Co. Shops
Seaboard Air Line	300	70-ton phosphor hopper	Pullman-Standard
Western Fruit Express	50	70-ton refrig.	Co. Shops
Wilson Car Lines	100[10]	40-ton refrig.	Co. Shops

FREIGHT-CAR INQUIRIES

Lehigh Valley	500, 1,000 or 1,500	55-ton box

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Chicago & North Western	3[11]	Rail Diesel	Budd

[1] Delivery scheduled to begin in April. Three of the Alco 1,600-hp. road switchers are to be equipped with heating boilers for use in passenger as well as freight service. The Chicago, St. Paul, Minneapolis & Omaha, the North Western's subsidiary, will receive 6 1,500-hp. freight "A" units from Electro-Motive and 1 1,600-hp. road-switcher from Fairbanks, Morse.

[2] Delivery to begin within three months.

[3] Delivery to begin in August.

[4] For the Colorado & Southern and the Fort Worth & Denver City. These are in addition to the 1,400 box and 800 hopper cars reported in the February issue, the orders for which have now been confirmed.

[5] To be equipped with eight roof hatches.

[6] Twenty-five for the Wisconsin Central.

[7] To cost about $2,500,000. For delivery during the second quarter of 1950.

[8] For use on the Missouri-Illinois.

[9] For use on the Missouri-Illinois.

[9] The cars to be built in Despatch Shops are for the Pittsburgh & Lake Erie. Deliveries scheduled to begin in May and to be completed by the end of the year.

[10] Delivery scheduled for February, 1951.

[11] Two of the units will be the 90-passenger RDC-1; the third, designated RDC-2, has seating space for 71 passengers and a 17-ft. baggage compartment. The cars, scheduled for April delivery, will be operated in suburban service within the Chicago area. The pilot model of the RDC was tested in trial revenue service on the C. & N. W. recently, and is now being operated in test runs on the Chicago & Eastern Illinois. R. L. Williams, president of the C.&N.W., said the new cars, which cost a total of $415,000, will be operated in trains of 2 or 3 units in periods of off-peak traffic.

The committee, representing the sponsor and supervisors, which will work directly with Battelle Institute, consists of F. McQuillin, West Penn Power Company, Pittsburgh, Pa., chairman; J. C. Fox, Virginian, Norfolk, Va.; J. Stair, Jr., Pennsylvania, Philadelphia, Pa.; T. F. Perkinson, General Electric Company, Schenectady, N. Y.; Charles Kerr, Jr., Westinghouse Electric Corporation, East Pittsburgh; L. W. Birch, Ohio Brass Company, Mansfield, Ohio, and E. C. Payne, Pittsburgh Consolidation Coal Company, Pittsburgh.

H. B. Oatley, Boiler Code Chairman, Honored

HENRY B. OATLEY, chairman of the A.S.M.E. Boiler Code Committee and retired vice-president of the Superheater Company, was honored with the degree of Doctor of Engineering by Stevens Institute of Technology on February 8.

An alumnus of the University of Vermont, Mr. Oatley spent his first ten years following graduation as a test engineer with the American Locomotive Company and then joined the Superheater Company which he served successively as mechanical engineer, chief engineer, and vice-president in charge of engineering. Subsequent to retirement as vice-president he became consulting engineer.

During these forty years he presented many technical papers before various

H. B. Oatley

engineering societies and railroad clubs, and has been responsible for numerous inventions relating to superheaters and other devices for locomotive use.

Long active in the A.S.M.E., of which he is a Fellow, Mr. Oatley has for some years headed up the Boiler Code Committee.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of November 1949	Month of November 1948	Eleven months ended with November 1949	Eleven months ended with November 1948
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	29,566	42,764	361,164	500,812
3-06	Total, Diesel-electric	14,398	10,253	137,896	94,881
3-07	Total, electric	756	945	8,733	10,720
3-04	Total, locomotive-miles	44,722	53,963	507,818	606,416
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,466	1,710	16,419	19,038
4-06	Empty, total	812	909	9,285	9,865
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	45,847	67,853	566,323	794,945
6-02	Total in oil-burning steam locomotive trains	13,816	19,487	163,594	231,016
6-03	Total in Diesel-electric locomotive trains	40,178	29,920	393,604	276,259
6-04	Total in electric locomotive trains	2,029	2,471	23,443	26,831
6-06	Total in all trains	101,886	119,738	1,147,092	1,329,128
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.05	1.06	1.05	1.07
10-02	Loaded freight car-miles	36.70	36.00	36.30	35.90
10-03	Empty freight car-miles	20.30	19.20	20.60	18.60
10-04	Total freight car-miles (excluding caboose)	57.00	55.20	56.90	54.50
10-05	Gross ton-miles (excluding locomotive and tender)	2,550	2,523	2,537	2,504
10-06	Net ton-miles	1,152	1,183	1,141	1,181
12	Net ton-miles per loaded car-mile (M-211)	31.40	32.80	31.40	32.90
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.40	65.30	63.90	65.90
14	Averages per train hour (M-211):				
14-01	Train miles	16.90	16.50	16.90	16.10
14-02	Gross ton-miles (excluding locomotive and tender)	42,558	41,080	42,374	39,893
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	42.20	46.60	41.90	46.30
14-02	All	39.30	44.60	39.40	44.30
15	Average net ton-miles per freight car-day (M-240)	794	957	791	960
17	Per cent of home cars of total freight cars on the line (M-240)	45.40	39.50	50.00	37.90
	PASSENGER SERVICE (DATA FROM I.C.C. M-213)				
3	Road motive-power miles (000):				
3-05	Steam	12,067	17,911	169,823	214,764
3-06	Diesel-electric	13,380	11,173	139,200	116,484
3-07	Electric	1,569	1,737	18,111	19,613
3-04	Total	27,016	30,840	327,248	350,935
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	261,018	288,593	3,072,228	3,268,327
4-09	Total in coal-burning steam locomotive trains	62,862	99,845	888,673	1,178,208
4-10	Total in oil-burning steam locomotive trains	37,966	47,011	479,619	590,796
4-11	Total in Diesel-electric locomotive trains	142,697	122,332	1,505,499	1,285,710
12	Total car-miles per train-miles	9.38	9.18	9.19	9.16
	YARD SERVICE (DATA FROM I.C.C. M-215)				
1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	1,365	2,404	19,305	28,524
1-02	Steam, oil-burning	256	375	3,021	4,282
1-03	Diesel-electric[1]	2,085	1,784	21,785	18,170
1-06	Total	3,731	4,592	44,128	51,303
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	70	116	983	1,353
2-02	Steam, oil-burning	13	18	168	221
2-03	Diesel-electric[1]	219	189	2,295	2,041
2-06	Total	337	359	3,832	4,001
3	Hours per yard locomotive-day:				
3-01	Steam	7.20	10.30	8.10	10.50
3-02	Diesel-electric	16.90	18.50	17.10	18.30
3-05	Serviceable	13.60	14.20	13.30	14.10
3-06	All locomotives (serviceable, unserviceable and stored)	10.80	12.50	11.10	12.50
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.78	1.86	1.86	1.87
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.80	0.77	0.77	0.76

[1] Excludes B and training A units.

Annual Report Bureau of Safety

THE annual report of Director S. N. Mills of the Interstate Commerce Commission's Bureau of Safety for the fiscal year ended June 30, 1949, sets forth in the usual form the results of inspection of safety-appliance equipment on railroads, together with information on hours of service of railroad employees, installation and inspection of signal systems, interlocking and automatic train-stop and train-control devices, investigation of accidents, prosecutions for violations of railroad safety laws and other activities of the bureau.

During the year under review, 1,072,219 freight cars, 27,481 passenger-train cars and 12,044 locomotives were inspected, as compared with 1,072,504 freight cars, 23,870 passenger-train cars and 11,748 locomotives in fiscal 1948. Of the 1949 total, 3.21 per cent of the freight cars, 3.28 per cent of the passenger-train cars and 4.12 per cent of the locomotives were found to be defective, as compared to the respective 1948 figures of 3.69 per cent, 4.13 per cent and 4.66 per cent.

Air brakes tested on 2,687 trains (consisting of 119,369 cars) prepared for departure from terminals were found operative on 119,193 cars, or 99.9 per cent.

That is why so many railroads with rapid dieselization programs choose General Motors locomotives ahead of all others.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION

General Motors, La Grange, Illinois

Home of the Diesel Locomotive

This percentage was attained, however, after 2,102 cars having defective brakes had been set out and repairs had been made to brakes on 1,580 cars remaining in the trains. Similar tests on 1,427 trains arriving at terminals with 77,307 cars showed that air brakes were operative on 97.7 per cent of the cars and that an average of approximately 1.2 cars per train were not controlled by power brakes.

According to the report, 728 reporting railroads and private car lines, which collectively own 2,199,216 freight cars, have equipped 1,845,518 such cars with power brakes which comply with specifications set out in the commission's September 21, 1945, order, as amended August 27, 1948, and October 10, 1949. As of June 30, 1949, 85.9 per cent of railroad-owned cars, but only 69.8 per cent of cars owned by private car lines, were equipped. In the matter of geared hand brakes, the report noted that the A. A. R. has issued certificates of approval for 25 types—14 vertical wheel types, 8 horizontal wheel types, and 3 lever types.

SUPPLY TRADE NOTES

WAUGH EQUIPMENT COMPANY.—The Waugh Equipment Company has acquired control of the *O. C. Duryea Corporation*, manufacturers of the Duryea cushion underframe, with the intent to merge Duryea with the *Hulson Company* and operate it as a division thereof. When the merger is effected, *V. R. Weiss*, now president of the Duryea corporation, will be elected a director of the Hulson Company. Existing engineering and service facilities of Duryea will be continued and augmented by those of Hulson.

◆

SPRING PACKING CORPORATION.—*Carl R. Moline* has been appointed chief engineer of improvement of present products and development of new products for the Spring Packing Corporation, Chicago.

Mr. Moline was formerly manager of the field research branch for Pullman-Standard Car Manufacturing Company.

Mr. Moline, a graduate of the University of Iowa (1933) with a degree in mechanical engineering, spent four years with the Sheaffer Pen Company, and two

Carl R. Moline

years with the Ajax Hand Brake Company as field engineer on installation and maintenance of hand brake equipment on all types of freight cars. Later, as chief engineer for the Allied Railway Equipment Company he became co-inventor of many parts of trucks used in high speed freight and passenger service. Mr. Moline joined Pullman-Standard in 1946 to aid in the development of a research division for designing new cars and improving rolling equipment, both freight and passenger. He was subsequently appointed manager of the field research branch.

◆

H. K. PORTER COMPANY.—*John L. McGara* has been appointed general manager, Pittsburgh district operations of the H. K. Porter Company, Pittsburgh, Pa. Mr. McGara is to have charge of

J. L. McGara

sales and operations of the three Porter plants in the Pittsburgh district; the Porter plant at Forty-ninth street in Lawrenceville (Pittsburgh) where locomotives, Quimby pumps and the Porter line of mixing and blending equipment are manufactured; and the two plants of the American-Fort Pitt spring division at Fifty-sixth street in Lawrenceville and at McKees Rocks, Pa.

◆

MANGANESE STEEL FORGE COMPANY.—*Edward W. Kavanagh*, formerly sales manager of the Ulster Iron Works, has joined the Manganese Steel Forge Company, Philadelphia, Pa., where he will be in charge of sales, service and research of the railway division, southern region, with headquarters at Norfolk, Va.

* * *

A machine for testing railroad car journal-box-bearing lubricants developed by the Texas Company—The machine, located at the company's Beacon, N. Y., laboratories, weighs seven tons—It simulates actual operating conditions for railway car bearings at speeds up to more than 100 m.p.h. and will handle both plain and roller bearings—Combined vertical loads of 50,000 lb. and axial loads of 15,000 lb. can be applied on each of two test journal bearings, one located on each end of the machine—All loading is accomplished hydraulically, and each of the two test bearings can be loaded independently.

WHITING CORPORATION.—The Whiting Corporation, Harvey, Ill., has moved its Philadelphia (Pa.) district sales office from Broad Street Station building to 9 Rittenhouse place, Ardmore, Pa. *G. M. Dennis* continues as district manager.

Elmore C. Brown

The corporation has opened its own district sales office in the M & M building, Houston, Tex. *Elmore C. Brown* has been appointed district manager for the Houston territory, to handle the sale of Whiting foundry equipment, cranes and railroad equipment, and the Swenson line of evaporators, spray dryers and chemical plant equipment.

Mr. Brown, a graduate of the University of Michigan (1933) with a B. S. degree in engineering, has been associated with Whiting for more than ten years. For the past five years he has been a sales engineer in the Chicago district office.

The Whiting Corporation has appointed the following companies as distributors of electric hoists: *Wisner, Inc.*, Rockford, Ill.; *Neff Equipment Company*, Toledo, Ohio; *Stone Supply Company*, Houston, Tex.; and *Barton Sales Company*, Fort Wayne, Ind. Barton has also been appointed as a distributor for Whiting's Trambeam overhead crane and monorail systems.

◆

WESTINGHOUSE ELECTRIC CORPORATION.—*John E. Payne* has been appointed manager of the Westinghouse Electric Corporation's Central district, with complete supervision of the company's business in the Pittsburgh, Pa., Cleveland, Ohio, Cincinnati and Detroit, Mich., areas. Mr. Payne's headquarters will be in Pittsburgh.

◆

CARNEGIE-ILLINOIS STEEL CORPORATION.—*J. Donald Rollins*, planning engineer of the Carnegie-Illinois Steel Corporation (United States Steel Corporation subsidiary), with headquarters at Pittsburgh, Pa., has been appointed assistant chief engineer at Pittsburgh. *Norman C. Michels*, assistant to the president of a clay products company since 1947, returns to Carnegie-Illinois to succeed Mr. Rollins. Mr. Michels was formerly a special engineer in the corporations general offices. *John H. Elliott*, general superintendent of the company's Irvin works, near Dravosburg, Pa., has been promoted to assistant general manager of operations. Succeeding Mr. Elliott is *Arno L. Billeter*, assistant general superintendent at the Irvin works. *Richard W. Claypoole* has been appointed assistant manager of sales, railroad materials and commercial forgings division of Carnegie-Illinois Steel Corporation, a United States Steel Corporation subsidiary.

Mr. Claypoole joined the Duquesne works of Carnegie-Illinois as a metallurgical observer in 1933 and the following year transferred to the Edgar Thomson works. He was appointed chief metallurgist at that plant in 1944, and, in 1946, joined the railroad sales division at Pittsburgh, Pa., as a product representative. In 1947, Mr. Claypoole was appointed assistant to manager.

◆

JANETTE MANUFACTURING COMPANY.—*W. H. SaLee* has been appointed general sales manager of the Janette Manufacturing Company, succeeding *Harvey Klunder*, who has resigned. *Ogden J. Maag* continues as assistant sales manager. *Frank C. Hartman*, who recently joined the company, will assist Mr. Maag.

◆

WESTINGHOUSE AIR BRAKE COMPANY.—*V. Villette*, manager of the Westinghouse Air Brake Company's Pacific district, San Francisco, Calif., has retired, and has been succeeded by *J. B. Hull*.

Mr. Villette joined the Air Brake Company on January 1, 1917, as a mechanical expert in the San Francisco office. He advanced to representative in 1922 and to district manager in 1929.

V. Villette

His earlier experience was gained on western railroads as machinist and locomotive engineer.

Mr. Hull, a graduate of Yale University's Sheffield Scientific School, joined the company's home office at Wilmerding, Pa., in 1920, as a special engineer. After serving in several engineering capacities, he was transferred to San Fran-

J. B. Hull

cisco office in 1929 as assistant district engineer. He became district engineer in 1935 and assistant manager in 1947.

◆

KOPPERS COMPANY.—*R. P. Jackson*, vice-president and district manager of the Wood Preserving Division of the Koppers Company, has been appointed Chicago district manager. *C. F. Seyer*,

R. P. Jackson

former sub-district manager at Houston, Tex., has been appointed manager of the Texarkana district, and *J. W. Sullivan*, sales representative at Houston, has become Houston district sales manager. As district managers in Chicago and Texarkana, Mr. Jackson and Mr. Seyer will be in charge of plants, procurement, and sales in those areas.

◆

GEORGIA-PACIFIC PLYWOOD & LUMBER CO.—*Harold C. Youngs* has been appointed manager of the railroad materials department of the Georgia-Pacific Ply-

wood & Lumber Co. to succeed L. U. West, resigned. Mr. Youngs for two months prior to January 1 had been executive assistant manager of the department.

◆

LIMA-HAMILTON CORPORATION.—*Alfred O. Weiland* has been appointed general manager of the Lima Works, Lima-Hamilton Corporation, at Lima, Ohio. During World War II, Mr. Weiland was vice-president and general manager

Alfred O. Weiland

of the General Machinery Ordnance Corporation, Charleston, W. Va. He had previously been a partner in the George A. Houston Company, consulting engineers, New York, and prior to that, vice-president and general manager of the Baldwin Southwark division of Baldwin Locomotive Company. Mr. Weiland was also vice-president and general manager of RCA-Victor at Camden, N. J.

◆

FAIRBANKS, MORSE & CO.—*J. C. Elmburg*, manager of the Atlanta (Ga.) branch of Fairbanks, Morse & Co., has been transferred to Portland, Ore., succeeding *Howard Oxsen*, who is returning to San Francisco, Calif., as manager of Diesel engine sales in that area. *George A. Hawkins*, manager of the company's sub-branch at Minneapolis, Minn., has been named branch manager at Atlanta.

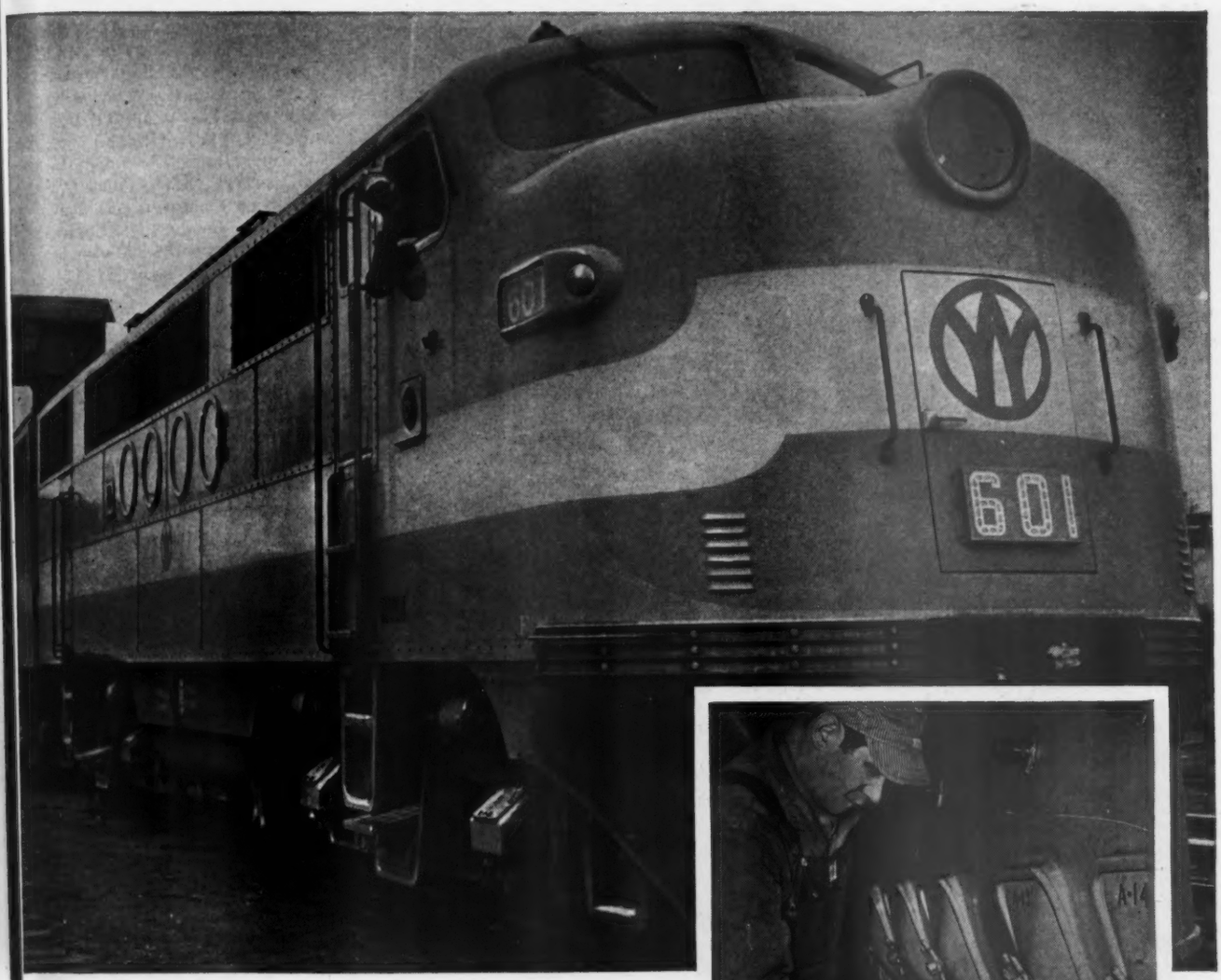
A $10,000,000 modernization and building program has been started by Fairbanks, Morse & Co., at its principal plants. Among the first project is to be the installation of a new $2,500,000 power plant, housing three 80,000-lb. steam boilers, at the Beloit (Wis.) works.

◆

SHIPPERS' CAR LINE CORPORATION.—The *Kansas City Car Company* and the *Acme Tank Car Corporation*, subsidiaries of the Shippers' Car Line Corporation, which is owned by the American Car & Foundry Co., have been merged with Shippers' Car Line. The Acme shop at East St. Louis, Ill., and the Kansas City Car Repair shop at North Kansas City, Mo., will continue as heretofore.

◆

COMBUSTION ENGINEERING-SUPERHEATER, INC.—*Samuel G. Allen*, formerly vice-chairman, has been elected chairman of the board of Combustion Engineering-



Mile after mile

ESSO DIESEL LUBRICATING OIL—DIOL RD—is supplying dependable "tailor made" lubrication for railroad diesels. Like all Esso Railroad Products, DIOL RD is specially designed to meet the most rugged operating conditions... to assure lasting, high-quality lubrication for diesels!

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ESSO STANDARD OIL COMPANY—Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charleston, W. Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — Little Rock, Ark. — New Orleans, La.

PROVED ON THE RUN — by over a *half million miles* of severe freight operation in the largest controlled field test ever conducted — DIOL RD has been tested and proved for dependable quality.

PROVED IN THE LAB — DIOL RD specially developed through rigidly controlled laboratory research and constant follow-up of road tests gives 4-WAY diesel lube protection:

1. **Reduces power-robbing engine deposits**
2. **Inhibits corrosion**
3. **Fights oxidation**
4. **Excellent additive retention**

PROVED ON THE JOB—you get assured satisfaction when you use Esso Railroad Products. Esso Sales Engineers make sure that Esso Products are giving you dependable performance. For any railroad fuel or lubricating problem be sure to call on Esso.

Superheater, Inc., to succeed the late Frederic A. Schaff. Mr. Allen is identified, as an officer or director, with several other companies, including the Franklin Railway Supply Company, Lima-Hamilton Corporation, G. M. Basford Company, and The Lummus Company. *Joseph V. Santry*, long president of Combustion Engineering Company and its successor, Combustion Engineering-Superheater, Inc., will serve also as chief executive officer in general charge of operations.

◆

S. KARPEN & BROS.—*Robert G. Brooks*, vice-president and general manager of the transportation seating division of S. Karpen & Bros., has been elected president to succeed Leo Karpen, who has been elected chairman of the board of

R. G. Brooks

directors. Mr. Brooks will continue also as general manager of the transportation seating division.

Mr. Brooks became associated with Karpen in August, 1923, as a clerk in the cost department. When the transportation seating division was organized at Michigan City, Ind., he was transferred there, working in various capacities until his appointment as general manager of the division in 1940. He was elected also vice-president of the firm in January, 1946, and became a member of the board of directors in January, 1948.

◆

GENERAL ELECTRIC COMPANY.—A new General Electric apparatus sales district has been established at St. Louis, Mo. The new district, which is under the direction of *G. F. Maughmer*, formerly manager of the sales office at Los Angeles, Calif., consists of all sales areas presently in the company's St. Louis, Kansas City, Mo., and Omaha, Neb., territories.

◆

AMERICAN CAR & FOUNDRY CO.—*J. Leonard Wood*, assistant vice-president in the engineering department of the American Car & Foundry Co., has retired after 44 years of service.

Mr. Wood, a graduate of Alabama Polytechnic Institute, became associated with American Car & Foundry in January, 1906, as local engineer in the Memphis, Tenn., plant. In January, 1928,

he was transferred to the New York office as assistant mechanical engineer; in December, 1936, was appointed mechanical engineer, and in January, 1944, became assistant vice-president.

◆

YOUNGSTOWN SHEET & TUBE CO.—*John M. Tuthill*, formerly assistant manager of flat rolled sales for the Youngstown Sheet & Tube Co., has been appointed manager of flat rolled sales, succeeding *Walter E. Scott*, retired. *L. E. Arnold*, formerly in the Detroit, Mich., district sales office, has been transferred to Youngstown, Ohio, as assistant manager of flat rolled sales, succeeding Mr. Tuthill.

◆

UNION CARBIDE & CARBON CORP.—*J. M. Spangler*, formerly director, vice-president and general manager of the National carbon division of the Union Carbide & Carbon Corp., has been appointed president of the division, after 35 years of service.

Mr. Spangler joined National Carbon in 1915, when his first assignment was

J. M. Spangler

contacting railway purchasing agents. In 1923, he was placed in charge of the company's Chicago sales office, and, 10 years later, became general sales manager. He was appointed vice-president in charge of sales in 1943 and vice-president and general manager in 1944.

◆

DUFF-NORTON MANUFACTURING COMPANY.—*James F. McCartney*, formerly eastern district sales manager of the Duff-Norton Manufacturing Company, at New York, has been appointed general sales manager, with headquarters at Pittsburgh, Pa. Mr. McCartney will be in charge of all industrial, mining and railroad sales of Duff-Norton jacks. A photograph of Mr. McCartney and a sketch of his career appeared on page 288 of the May, 1949, *Railway Mechanical Engineer*.

◆

GIDDINGS & LEWIS MACHINE TOOL CO.—The Giddings & Lewis Machine Tool Co. will move all operations of its subsidiary, the Cincinnati Planer Company, now at Cincinnati, Ohio, to Fond du Lac, Wis., by July 1. The products of the subsidiary will continue to be sold as Cincinnati Hypro. The Cincinnati Company was purchased by Giddings & Lewis in July, 1948, and the sales and engi-

neering departments of the two companies were consolidated and transferred to Fond du Lac in July, 1949.

◆

BLACK & DECKER MANUFACTURING CO.—Black & Decker has opened a new service station and sales office at 1640 N.W. Johnson street, Portland 9, Ore., in charge of *Gus Nelson*, service engineer, and *A. W. Escoffier*, sales engineer. The station offers complete facilities for repair and service to tool users in Oregon, southern Washington and southern Idaho.

◆

WYANDOTTE CHEMICALS CORP.—*C. B. Robinson*, vice-president of the Wyandotte Chemicals Corporation, in charge of the J. B. Ford Division, has retired,

C. B. Robinson

but will continue to serve as a sales consultant. *F. H. Tholen* has been appointed assistant general sales manager of the J. B. Ford Division.

Mr. Robinson joined the J. B. Ford Company in 1917, working his way up until he became president of that company in 1929. In 1943 when the Ford company became a division of Wyandotte, he was named vice-president of the Wyandotte organization.

◆

AUTOMATIC TRANSPORTATION COMPANY.—The Automatic Transportation Company has appointed the following companies to handle its line of Skylift and Transporter electric industrial trucks: *Nook & O'Neill, Inc.*, 10028 Carnegie avenue, Cleveland, Ohio, as northwestern Ohio distributor; *P. W. Voss & Associates*, 918 South Michigan avenue, Chicago, and *Nelson Equipment Distributors*, 913 Roosevelt building, Indianapolis, Ind., to serve the state of Indiana, except for Porter, La Porte, and Lake counties.

◆

AIR REDUCTION SALES COMPANY.—*C. B. Armstrong*, formerly manager, railroad sales, Eastern region, of the Air Reduction Sales Company, has been appointed assistant to the vice-president, railroad sales, and *D. E. Dallman*, formerly division manager at New York, has been appointed to Mr. Armstrong's previous position. Both will maintain headquarters at 60 East Forty-second street, New York. *J. H. Berryman*, formerly machine weld-

Twilight in The Berkshires

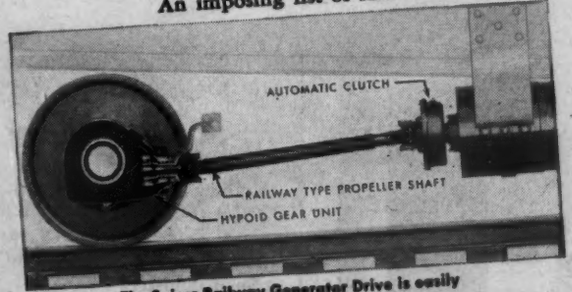
The new *New England States* —

Royalty on the Rails

te from Diesel to Ob...

The New England States...
Spicer Generator-Drive Equipped

The *new* New England States is an all-private-room Dreamliner . . . with such luxury features as rubber-foam mattresses and circulating ice water in each room . . . enclosed lavatory for every double room or suite . . . a new stainless steel diner . . . and a luxurious observation car for refreshments and relaxation. Demands for electricity are heavy, and they're amply filled by the steady, dependable performance of Spicer Railway Generator Drives. An imposing list of America's crack trains and streamliners rely upon Spicer equipment for electrical service of the highest efficiency. Write for literature giving complete details of the Spicer Railway Generator Drive.



The Spicer Railway Generator Drive is easily adaptable to old and new equipment

46 YEARS OF Spicer SERVICE

SPICER MANUFACTURING
Division of Dana Corporation
TOLEDO 1, OHIO

The Water Level Route — You Can Sleep

NEW YORK CENTRAL
BOSTON & ALBANY ROUTE

ing specialist and assistant metallurgical engineer, has been appointed assistant to the manager, technical sales division and will be responsible for technical promotion and sales of equipment for the recently introduced Aircomatic welding process.

◆

PHELPS DODGE COPPER PRODUCTS COMPANY.—*H. W. Finnell, Jr.*, has been appointed Pacific Coast sales manager of the Phelps Dodge Copper Products Corporation, with headquarters at Los Angeles, Calif.

◆

AMERICAN AIR FILTER COMPANY.—*Herman Nelson Division.*—The American Air Filter Company, Louisville, Ky., and the Herman Nelson Corporation, Moline, Ill., have merged. The Nelson Corporation will be operated as the Herman Nelson division of American Air Filter and will continue to maintain headquarters and facilities in Moline. The main company offices and headquarters will be in Louisville. *W. G. Frank*, executive vice-president, and *Richard H. Nelson* have been elected directors of the combined firm and *Richard H. Nelson* and *Robert W. Nelson*, vice-presidents.

◆

PYLE-NATIONAL COMPANY.—*Samuel MacClurkan* has been appointed to the newly created position of manager of railway sales of the Pyle-National Company, with offices in the Railway Exchange Building, 80 East Jackson blvd., Chicago. Mr. MacClurkan was formerly associated with the American Arch Co.

◆

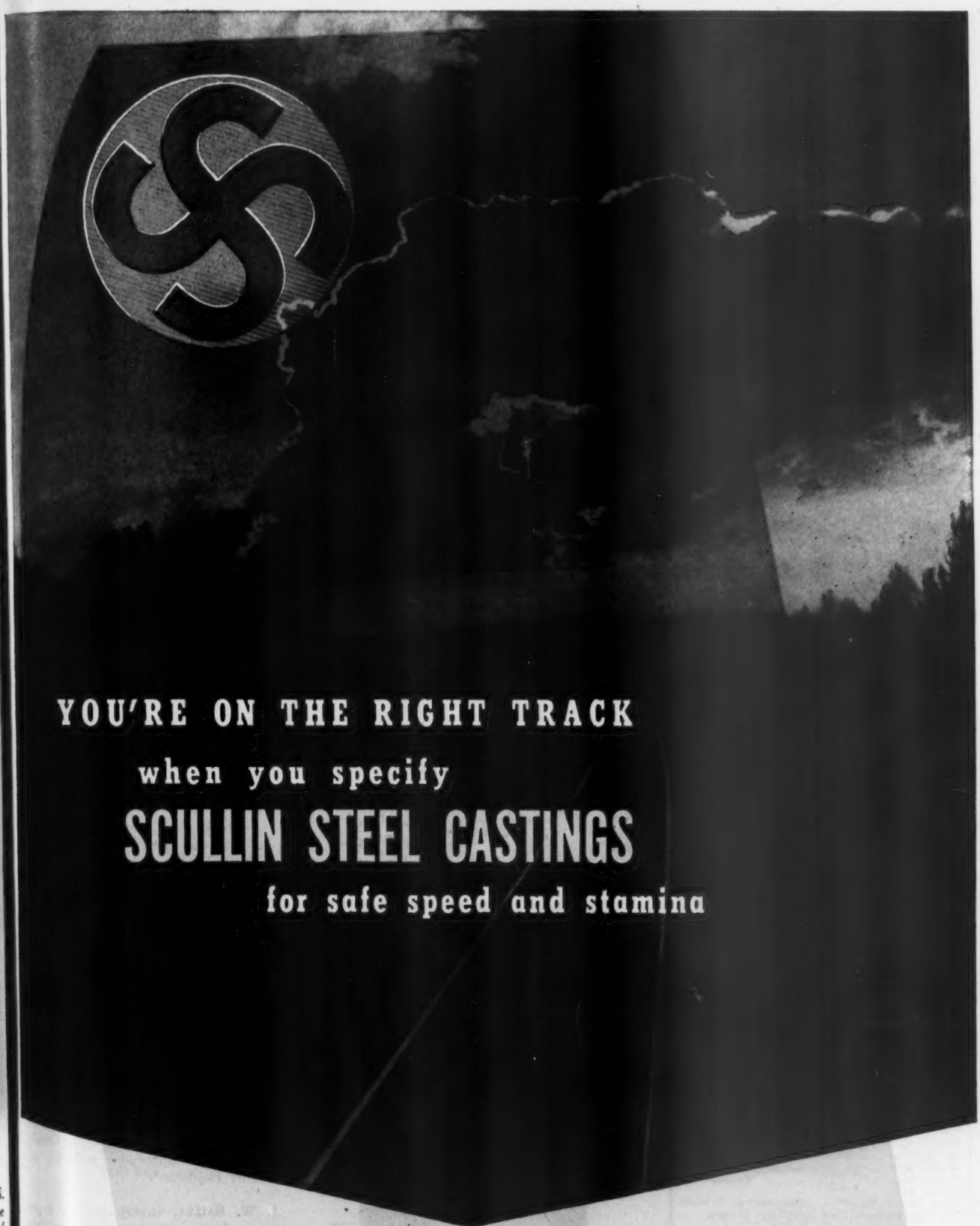
MCDOUGALL-BUTLER COMPANY.—*Frank G. Penl* has been appointed to direct sales of transportation finishes for the

Frank G. Penl

McDougall-Butler Company, Buffalo, N. Y. Mr. Penl has been identified with the paint industry for 24 years, many of which have been devoted to sales in the transit industry.

◆

HUCK MANUFACTURING COMPANY.—*Robert N. Hendrickson* has been appointed vice-president in charge of sales engineering, and *Frank A. Dobbe* vice-president in charge of sales of the Huck Manufacturing Company. Mr. Dobbe formerly was manager of sales for the South Chester Corporation.



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- locomotive castings of every kind
- all types of understructure castings for freight cars

SCULLIN STEEL CO.

SAINT LOUIS 10, MISSOURI

NEW YORK • CHICAGO • CLEVELAND • BALTIMORE • RICHMOND, VA. • MEXICO CITY, D. F.

ALUMINUM COMPANY OF AMERICA.—A new division for the rolling of magnesium sheet will be established by the Aluminum Company of America at its New Kensington, Pa., works in the near future. Magnesium rolling operations previously conducted at the Kensington works were discontinued in 1947.

◆

AMERICAN WELDING & MANUFACTURING CO.—*M. R. Minnick*, who has been appointed general manager of sales of the American Welding & Manufacturing Co. as announced on page 174 of the March

M. R. Minnick

issue, has been with the company for 27 years and has served in many manufacturing and sales capacities. He was appointed sales manager in 1936, and has supervised establishment of regional offices in Philadelphia, Pa.; Cleveland, Ohio; Detroit, Mich., Chicago, Minneapolis, Minn.; Los Angeles, Calif.; Washington, D. C., and Paterson, N. J.

Obituary

FREDERIC A. SCHAFF, chairman of the board of Combustion Engineering—Superheater, Inc., whose death was reported in the March issue, attended the Culver Military Academy and in 1907 was graduated in mechanical engineering from Purdue University. He spent the next three years with the Boston & Albany and the New York Central after which he was engaged in irrigation and power engineering in Texas. In 1913 he joined the service department of the Locomotive Superheater Company and later was appointed assistant to the president. He was elected vice-president in 1916 and in 1930 was elected president of the Superheater Company, successor to Locomotive Superheater. Mr. Schaff was elected also president of the Combustion Engineering Company, Inc., in 1933, and chairman of the board in 1940. When Superheater and Combustion Engineering merged in January, 1949, he was elected chairman of the board of the combined company.

Frederic A. Schaff

◆

JOHN BUCK, assistant works manager of the Scullin Steel Company, St. Louis 10, Mo., died on February 9. Mr. Buck was 59 years old.

PERSONAL MENTION

General

JOHN F. RYAN, assistant superintendent of machinery of the Louisville & Nashville at Louisville, Ky., has been appointed superintendent of machinery, with headquarters at Louisville.

W. E. BUCK has been appointed general supervisor machinery and production of the New York Central System at New York, with supervision over the shop machinery and tool committee at Buffalo and supervisors of production at steam locomotive shops.

H. ALLEN MONROE, chief clerk in the mechanical department of the Bangor & Aroostook, has been appointed assistant to the mechanical superintendent at Derby, Me.

C. N. WIGGINS, general master mechanic of the Louisville & Nashville at Louisville, Ky., has been appointed assistant superintendent of machinery at Louisville.

W. I. JOHNSON, JR., has been appointed mechanical engineer of the Louisville & Nashville, with headquarters at South Louisville, Ky. Mr. Johnson was formerly assistant mechanical engineer.

FRANK FAHLAND, mechanical engineer in the motive power and machinery department of the Union Pacific at Omaha, Neb., has been appointed research and standards engineer.

J. W. BAILEY, superintendent motive power and car equipment of the Southern Ontario district of the Canadian National at Toronto, Ont., has retired on pension. Mr. Bailey was born at Liskeard, Cornwell, England, on February 15, 1885, and entered railroad service on February 3, 1904, as a fireman with the C.N. at Fort Erie, Ont. He later served, successively, as machinist and leading hand machinist at Fort Erie; locomotive foreman at Lindsay, Ont.; general foreman at Deering, Me,; night foreman at Lon-

gue Point, Ont.; locomotive foreman at Allendale, Ont., and general foreman, motive power shop, at Montreal. Mr. Bailey subsequently became superintendent of that shop, transferring to the Stratford, Ont., motive power shop in February, 1939. He was appointed superintendent motive power and car equipment of the Southern Ontario district at Toronto in May, 1944.

G. L. GALLOWAY, superintendent motive power and car equipment of the Northern Ontario district of the Canadian National at North Bay, Ont., has been transferred to the Montreal district at Montreal, Que.

D. M. BAXTER, mechanical engineer of the Louisville & Nashville at South Louisville, Ky., has retired.

W. S. DAVIS, superintendent motive power and car equipment, Montreal district, of the Canadian National, has been transferred to the Southern Ontario district, with headquarters at Toronto, Ont.

F. L. KING, mechanical superintendent —Diesel and electric power, of the Chicago, Milwaukee, St. Paul & Pacific, has been relieved, at his own request, from this assignment and has been appointed master mechanic of the Superior and Madison divisions with such other duties as may be assigned, with headquarters as before at Milwaukee. The position of mechanical superintendent has been abolished.

A. G. HOPPE, general superintendent of the locomotive department of the Chicago, Milwaukee, St. Paul & Pacific, at Milwaukee, Wis., has been relieved, at his own request, of this assignment and the position has been abolished. Mr. Hoppe has been appointed engineer of research and development, with jurisdiction over the mechanical engineer and test department, and with such other duties as may be assigned.

F. W. BUNCE, mechanical superintendent of steam power of the Chicago, Milwaukee, St. Paul & Pacific, has been appointed superintendent of motive power, with headquarters as before at Milwaukee. The position of mechanical superintendent of steam power has been abolished.

C. J. BODEMER, superintendent of machinery, Louisville & Nashville, with headquarters at Louisville, Ky., has retired after 50 years of service. Mr. Bodemer was born on March 8, 1880, at Cincinnati, Ohio. Following graduation in mechanical engineering from Purdue University in 1900, he entered L. & N. service as a special apprentice in the Covington (Ky.) shops, subsequently becoming foreman of the erecting shop at Covington. In 1905 he was transferred to the South Louisville shops, where he later became assistant general foreman of the locomotive shop. After serving as general foreman at Etowah, Tenn., he returned to South Louisville as general foreman, later being appointed assistant master mechanic. Mr. Bodemer was transferred to Decatur, Ala., in 1914, as master mechanic and to Louisville as assistant superintendent of machinery in 1919. He was appointed superintendent of machinery in 1928.

Electrical

ROBERT L. MORRIS, air-conditioning supervisor of the Louisville & Nashville at South Louisville, Ky., has been appointed electrical supervisor at Louisville, Ky. Mr. Morris will continue his supervision over air-conditioning equipment. His duties as electrical supervisor will embrace electrical equipment in connection with passenger-train-car and locomotive lighting and electrical matters at outlying shops.

Car Department

E. H. FARISS, gang foreman, car department, of the Norfolk & Western at Winston-Salemn, N. C., has been transferred to Roanoke, Va., as assistant foreman, passenger-car shop.

E. R. PAYNE, assistant foreman, passenger car shop, of the Norfolk & Western at Roanoke, Va., has been transferred to Norfolk, Va., as coach yard foreman.

JAMES GRAY, car foreman, Northern Ontario district of the Canadian National at North Bay, Ont., has been appointed car foreman of the Southern Ontario

DOORS • SIDE PANELS
BULKHEADS and PARTITIONS
in This Luxury Car are *73% Lighter*
Than Standard Steel Construction . . .

...because they are MET-L-WOOD

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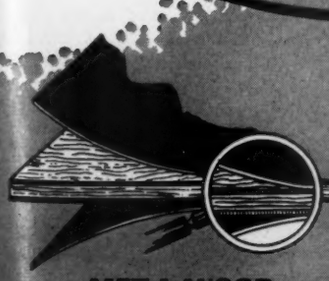
Met-L-Wood, used in passenger cars, locomotives and baggage cars cuts deadweight to a minimum consistent with specified strengths, stiffnesses and durability. As an example, Type 2P2-3/8" Met-L-Wood, used in side panels and partitions has the stiffness of 1/4" steel plate—yet weighs only 2.6 lbs./sq. ft. as against 10 lbs./sq. ft. for 1/4" steel plate!

Whether you require prefabricated Met-L-Wood units to your specifications, or can use stock sizes and finishes, the basic utility and economy of Met-L-Wood for railroad rolling stock construction is worth investigating . . . today. Write for details on your specific requirements. Our engineering staff will gladly assist you in adapting Met-L-Wood versatility to your needs.



MET-L-WOOD CORPORATION

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MET-L-WOOD · *STRONG . . . LIGHT . . . Smooth Finish . . . Sound Deadening . . . Fire-Resisting . . . Insulating*

district, with headquarters at Toronto, Ont.

A. E. TAYLOR, car foreman of the Canadian National at Toronto, Ont., has been appointed car foreman of the Northern Ontario district, with headquarters at North Bay Ont.

G. R. CARR, gang leader, erecting shop, of the Norfolk & Western at Roanoke, Va., has been transferred to Winston-Salem, N. C., as gang foreman, car department.

W. H. RATH, foreman at the Toronto coach yard of the Canadian National, has been appointed car foreman, Toronto Fleet street, with headquarters at Toronto, Ont.

C. A. STARK has been appointed general car foreman of the Chicago & North Western at Milwaukee, Wis.

Master Mechanics And Road Foremen

CARL A. LOVE, assistant general master mechanic of the Louisville & Nashville, has been appointed general master mechanic, with headquarters at Louisville, Ky.

J. J. NICOL, general foreman, equipment department, Michigan Central, at Bay City, Mich., has been appointed assistant master mechanic at that point. The position of general foreman, equipment department has been abolished.

W. W. BATES, division master mechanic of the Chicago, Milwaukee, St. Paul & Pacific at Milwaukee, Wis., has been given jurisdiction over the first, second and third districts, with headquarters at Milwaukee.

B. W. SWAIN, general foreman of the St. Louis - San Francisco at Sherman, Tex., has been appointed master mechanic, with headquarters at Sherman.

Shop and Enginehouse

D. C. GAHM, assistant foreman in the machine shop of the Norfolk & Western at Portsmouth, Ohio, has been appointed foreman of the shop.

E. D. F. WHITE, locomotive foreman of the Canadian National at Sarnia, Ont., has been appointed locomotive foreman at Belleville, Ont.

E. A. MANETTA, foreman, coach yard, of the Norfolk & Western at Norfolk, Va., has been transferred to the machine shop at Portsmouth, Ohio, as assistant foreman.

J. E. SAUVE, inspector, Central Region of the Canadian National has been appointed boiler inspector, Quebec district with headquarters at Quebec, Que.

D. J. MCCUNIG, locomotive foreman of the Canadian National at St. Thomas, Ont., has been appointed locomotive foreman at Sarnia, Ont.

J. G. SMITH, foreman of the machine shop of the Norfolk & Western at Portsmouth, Ohio, has retired.

R. BABB, locomotive foreman of the Canadian National at Belleville, Ont., has been appointed general foreman of the enginehouse at Turcot, Que.

C. HALBERT has been appointed locomotive foreman of the Canadian National at St. Thomas, Ont.

JOHN I. STEWART, supervisor of shop machinery and tools, of the New York Central System at Buffalo, N. Y., was tendered a testimonial dinner at Buffalo on February 27 upon his retirement after 43 years of service on the road. Mr. Stewart was born in Liverpool, England, on February 14, 1883. He was educated at Collegiate Institute (1898) and took extension and correspondence courses in mechanical engineering. His first employment, beginning in 1889, was as a machinist in marine and general contractor work. He became a machinist in the service of the Michigan Central in 1906 and from November 1, 1916, to January 1, 1922, was, successively, machine foreman and supervisor of shops. He was appointed supervisor shop machinery and tools of the New York Central System in 1933. Mr. Stewart has been chairman of the machinery and tool committee of the New York Central System since 1943. He is also a member of the Locomotive Maintenance Officers' Association.